JUN 28 1926

Rock Products

With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

Chicago, June 26, 1926 (Issued Every Other Week) Volume XXIX, No. 13

Long after first cost has been written off, Timken Bearings keep Timken-equipped machines at full precision and rate of output. That's the velvet *which may make it economical for you to junk now, in favor of the modern machinery designed around Timken Bearings. They save power, lubricant, time, labor and needless complication, while preventing wear.*

THE TIMKEN ROLLER BEARING CO., CANTON, OHIO

MEMBER A.B.C. *The Only Paid Circulation in this Industry* MEMBER A.B.P.

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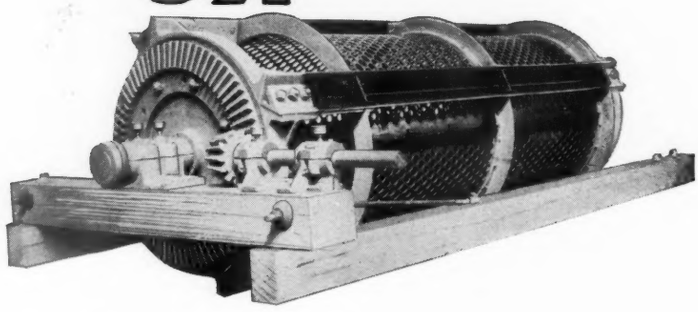
SCREENS by S-A



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IT is not necessary to talk about construction when actual performance records show outstanding merit. There is no mystery to the operation of a rotating screen but sturdy design, good materials and careful workmanship on large revolving screens, keep them operating on your job with no costly shutdowns.

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STEPHENS-ADAMSON MFG. CO.
AURORA, ILLINOIS, AND LOS ANGELES

STEPHENS-ADAMSON

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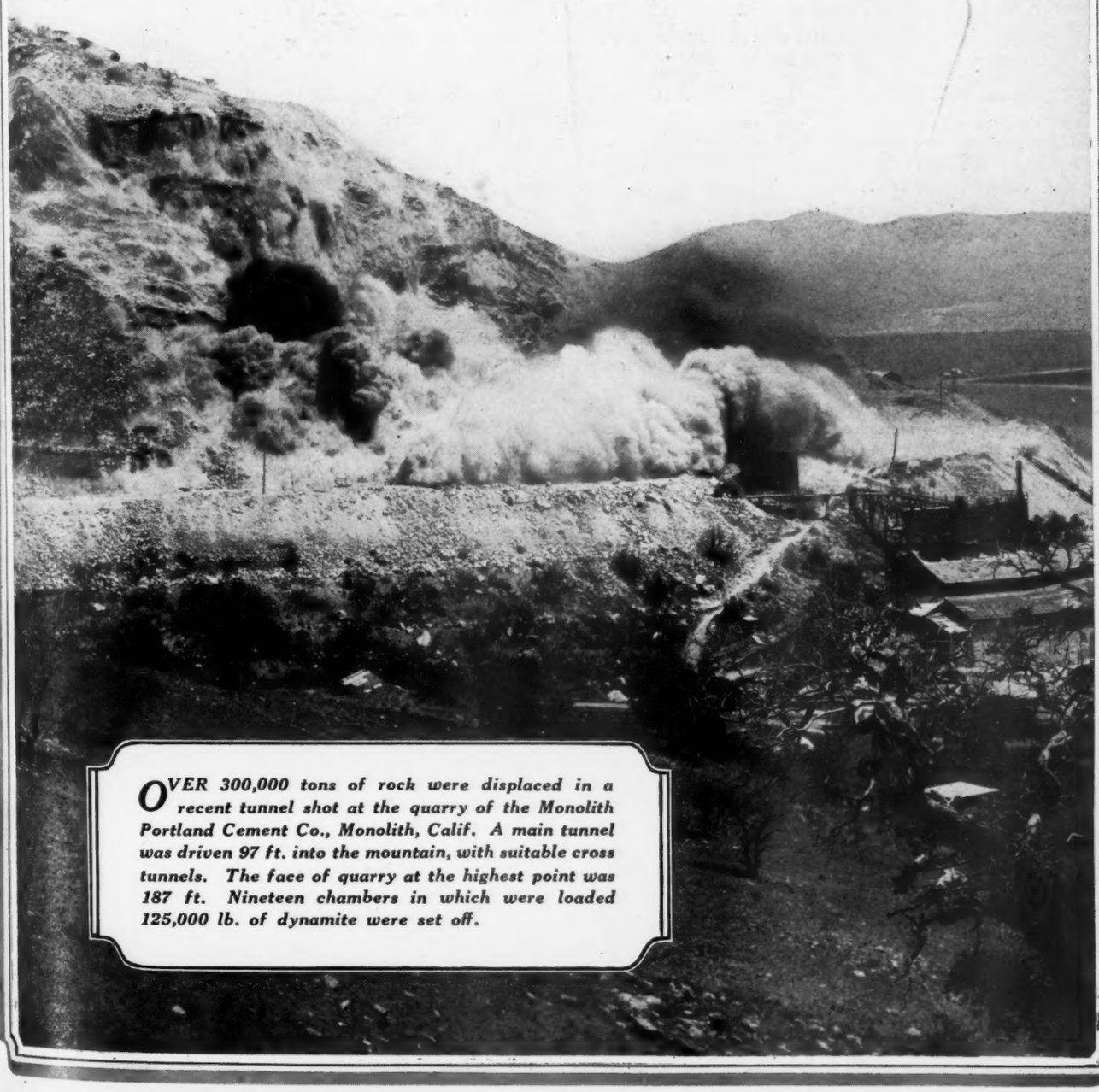


OVER 300,000 tons of rock were displaced in a recent tunnel shot at the quarry of the Monolith Portland Cement Co., Monolith, Calif. A main tunnel was driven 97 ft. into the mountain, with suitable cross tunnels. The face of quarry at the highest point was 187 ft. Nineteen chambers in which were loaded 125,000 lb. of dynamite were set off.

General view of plant of Florida Rock Products Co., Brooksville, Fla. The Amiesite plant is at left and connected by conveyor with crushing plant at right

Crushing and Washing Tampa Limestone

Florida Rock Products Co., Brooksville, Fla., Has Built Third Plant for Working in This Geological Formation

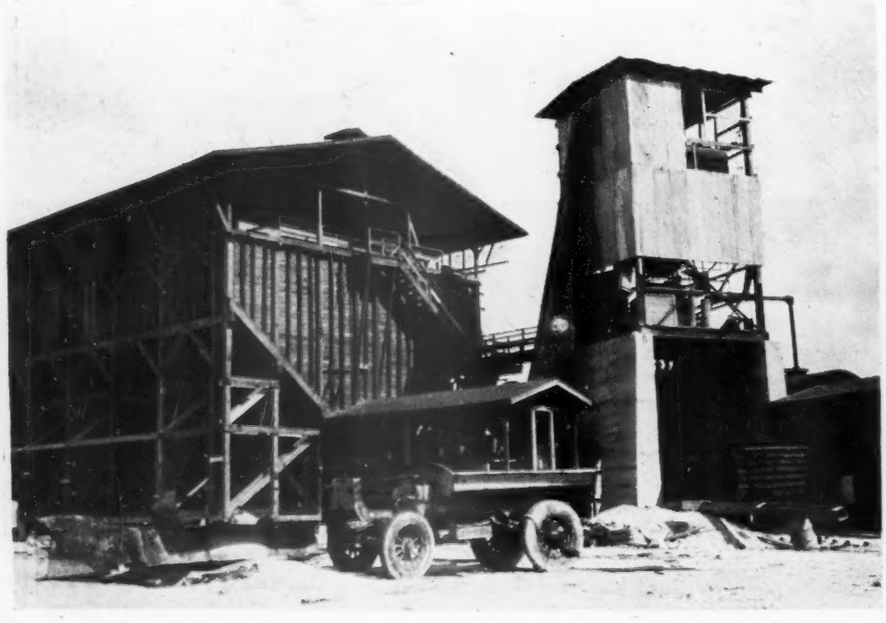
THE Florida Rock Products Co. has a plant a mile out of Brooksville, Fla. Brooksville is in Hernando county, which is one of the counties underlaid with the formation that geologists know as the Tampa limestone. This is the only limestone in Florida that can be crushed to make a product like the usual commercial crushed stone produced generally throughout the United States. Anyone familiar with the crushed stone industry feels a little bewildered in traveling through Florida and seeing what passes for crushing plants there until he comes to this plant, which in outward appearance at least resembles the big tonnage plants so commonly found throughout such states as Ohio and Pennsylvania.

But the resemblance is only on the outside, for the Tampa limestone needs a very different treatment from the older limestones in the north. It occurs in large and small boulders in a matrix of soft and clayey limestone. These boulders are so coated with this that the only practical method is to pass limestone and matrix through the plant and wash all the stone free from adhering material.

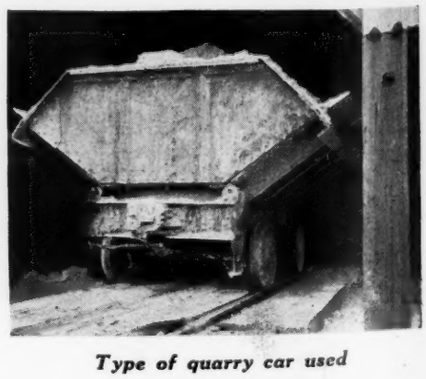
There are several plants in the country in which crushed stone is washed, but none of these have quite the problem that had to be solved by the Florida Rock Products Co. The present plant is the third the company has built. The previous plants were successful in producing a good quality of crushed stone, but their principal value was in developing the present methods of crushing and washing, so that production could be carried on in the most economical way. The result is a plant which is one of the most notable plants which has been built in recent years, a plant which does what it was expected to do and which has met with no setbacks to production except those occasioned by car shortages.

The quarry has been opened to what is an unusual depth in Florida, as the face is 60 ft. high where it is being worked at the present time. Well drill holes are put down with a Keystone drill a short distance below the face and shot with black powder. The broken rock is loaded by a 50B Bucyrus steam shovel. Except for the shovel all the machinery is driven by electric power. A steam shovel was preferred in this quarry as it has been found to be somewhat quicker in handling this kind of rock.

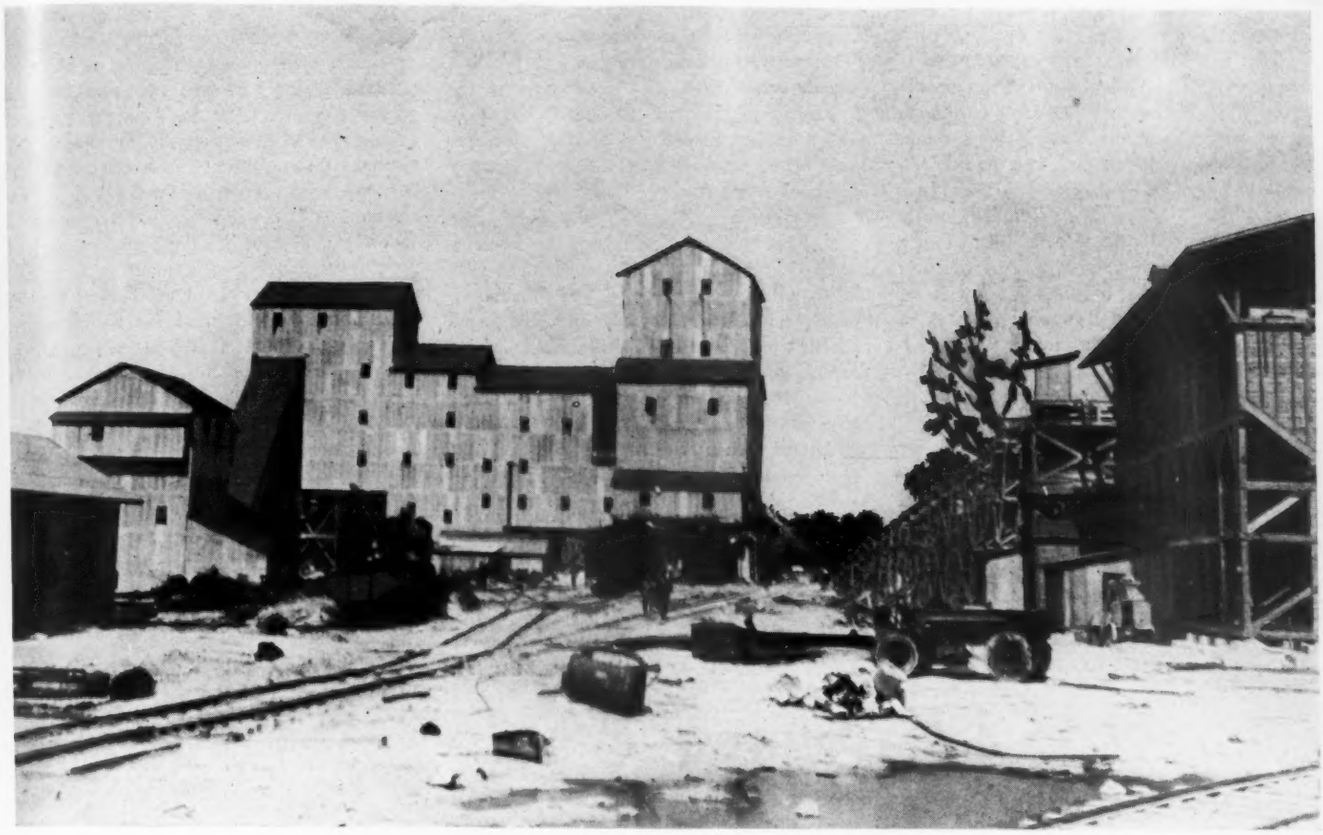
The cars hold 8 yd. and were made by the Easton Car & Construction Co. They are pulled to the plant up a long incline by a 110-h.p. double friction hoist. The cars dump to a hopper, which has a pan conveyor and feeder, which takes the rock to a 60x38-in.



End of Amiesite plant showing elevator loading material for shipment



Type of quarry car used



Crushing plant and Amiesite plant of Florida Rock Products Co. This is the third plant built by this company in its effort to develop the most economical methods of production

Looking down the incline at the 60-ft. quarry face. This is an unusual depth for quarry working in Florida. Well drills, black powder and a steam shovel get out the material

single roll crusher. The product of this crusher is taken to a scalping screen. A pair of 54-in. by 24-in. rolls crush the oversize.

A new pit installation has been made recently which is expected to more than double the output. A Model 261 Marion steam shovel, 16-yd. Western cars and two 35-ton standard gage locomotives have been purchased. The 16-yd. cars will dump directly on the apron feeder that feeds the primary crusher. A fill for an approach to the primary crusher is being made as this is written.

Both log washers and washing cylinders are used for washing the crushed material and after washing the material is sized by the usual sizing screens and the various sizes sent to bins. The washing is very thorough. Samples caught from the streams entering the bins showed only a drip of clear water.

The waste and the water, together with some fine hard limestone, flow through launders to a settling pond. Arrangements have been made for separating the fine stone, now being sold for fine concrete aggregate.

The products of this plant are shipped all over the state wherever a good concrete aggregate is needed. The concrete products plants at St. Petersburg and other places use a lot of the finer sizes. But the greater part goes into general construction.

An "Amiesite" plant has been built since the crusher has been erected and this is being used to furnish material for paving roads and streets in the western part of Florida.

All the machinery for the crushing plant, except as otherwise stated, was furnished by the Allis-Chalmers Manufacturing Co. The engineering work was all done by the engineers of this company and Allis-Chalmers motors are used throughout the plant.

The main office of the Florida Rock Products Co. is in Tampa, Fla. L. T. Porter is president of the company and R. B. Murdock is vice president in charge of operations. A. E. Edinger is secretary-treasurer.

Extensive Construction Program of U. S. Gypsum Co.

THE United States Gypsum Co. has under way an extensive construction program calculated to increase its production facilities, and added warehouse space to assist in getting the product to the customer.

One important development is the construction of a complete new plant at Detroit. Seven acres of industrial property on the River Rouge, Dearborn, Mich., were purchased and ground is now being broken for a calcining plant, a mixing plant for the production of sanded plasters, a board mill to produce "Sheetrock" wallboard, "Rocklath" or plasterboard and "Gyp-Lap" fire-resistive sheathing lumber, and a tile plant. The buildings will be of permanent construction and will be fitted out with the most modern equipment.

Along with this construction, the company is building a breakwater and concrete dock at Alabaster, Mich., where one of its oldest quarries is located. Automatic loading devices will be installed, and raw gypsum will be shipped from there to River Rouge in boats to be owned by the company. This construction is required to meet the demand for the company's products in the Detroit industrial field and throughout eastern Michigan, and will permit of economical, efficient distribution of materials to dealers by means of their own trucks.

Another project is a new paper mill at Oakfield, N. Y., which is just now being put into operation. This new construction is located a short distance from the main plant, and consists of a paper-mill building 45x500 ft. in size; a stock warehouse 60x280 ft.; a boiler room 60x40 ft., and a turbine room 60x20 ft. All of these buildings will be built with frames of reinforced concrete and with roofs and curtain-walls of "Structolite" structural gypsum, the roofs being so constructed so as to prevent the condensation of moisture which might damage machinery and product. Its output will be 75 tons a day of news-lined chip paper, which will be used at Oakfield and at New Brighton, N. Y., and Plasterco, Va., for the exterior surfacing of the company's three board products.

Preparing to Make New Specialty

At New Brighton, a new specialty plant is expected to go into operation about July 1, to produce 200 tons a month of a new product, "Plastint," a plaster tinted so as to provide decoration as well as structural wall-finish. This material, introduced to the building trades a few months ago, is being extensively used for many types of buildings.

The expansion of the specialties plant which was built last year at Gypsum, Ohio, also has been made necessary by the demand for this material. The plant building is being extended on both sides, and new blending, grinding, mixing and packing equipment is being installed. Additional warehousing facilities and laboratory equipment to permit of a high degree of control in the manufacture of this material in nine colors, are being added both at Gypsum and at New Brighton.

Construction on Staten Island includes a new board mill for the production of "Sheetrock," "Rocklath" and "Gyp-Lap." It is expected to begin next fall to produce 300,000 sq. ft. a day of these boards. The building will be two stories high, 36x565 ft. in size, built of steel, concrete and brick, with a gypsum roof. On the upper floor will be two board machines and the kilns; the floor below will be used for storage, truck-loading and car-shipments.

In order to provide calcined gypsum for the new operation, considerable extensions are being made to the calcining plant. The principal items here are two new oil-fired rotary calciners, 150 ft. long, which will double the stucco capacity of the plant. The United States Gypsum Co. has let contracts for the construction of two steel cargo-steamers of 6,000 deadweight tons each, to facilitate and expedite the transportation of rock from Nova Scotia to New Brighton, and the large silos built at the latter point last summer will be used for rock storage.

Brooklyn, Harlem, and Harrison, N. J., are the locations of the first three units in a new system of warehouses being built up in the region supplied by the New Brighton mill. A complete line of the company's products will be stocked at these warehouses.

Additional Warehouses at Several Points

Adjacent to the Harrison warehouse will be a barge-slip, at which the company's boats will dock with cargoes from New Brighton. These cargoes will be unloaded by an electrically operated overhead traveling crane, and will be held in the warehouse until required by dealers. They will be loaded onto the dealers' trucks by means of the same equipment. This warehouse and the one at Harlem have just been put under construction. Los Angeles, San Francisco, and Oakland, Calif., Seattle and Portland are the points on the Pacific Coast where warehouses will be located for the same purpose.

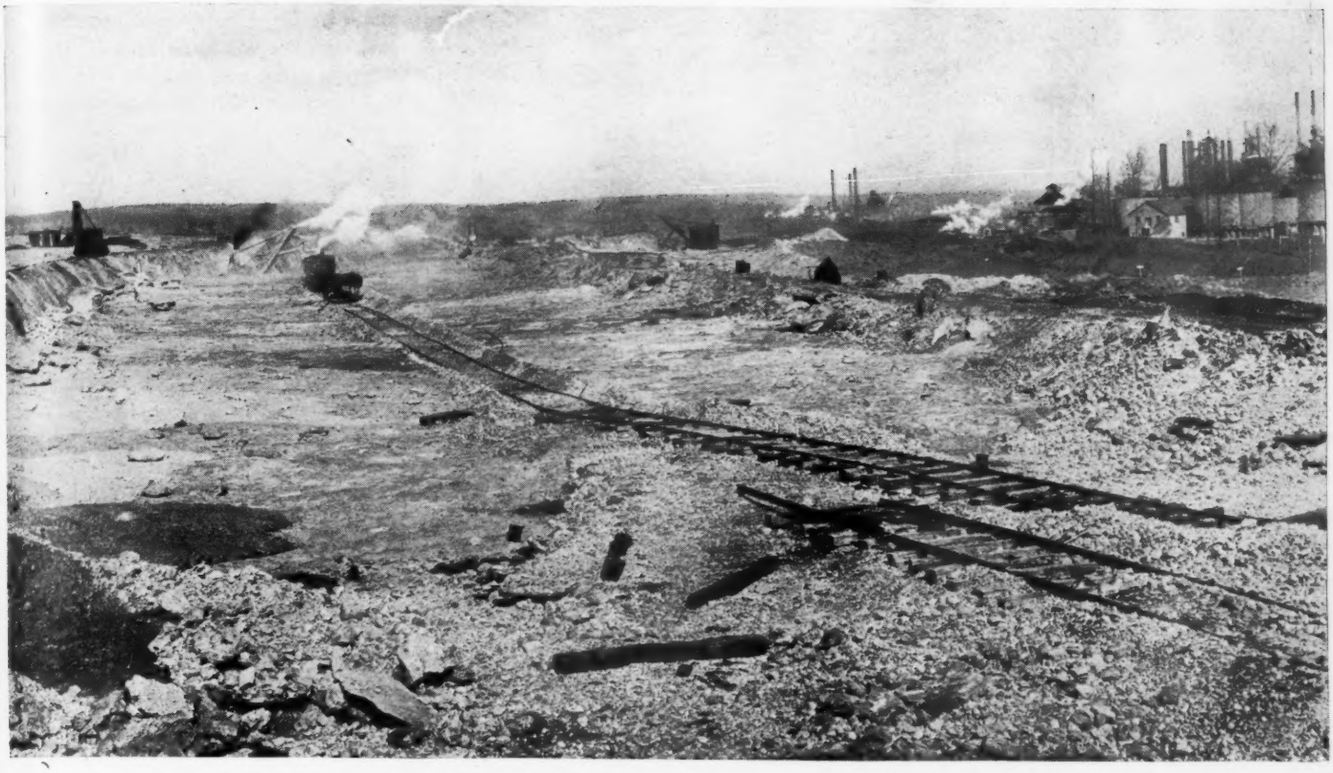
Board Mills Being Expanded

At Sweetwater, Southard and Plasterco, the board mills are being expanded. Capacity will be increased 65% at Plasterco, through extensions to both ends of the existing board plant, additions to the kilns and to facilities for paper storage and storage of products. Personnel throughout the works is being increased accordingly.

The capacity increase at Southard will be about 50%. This requires additions to the present "Sheetrock" warehouse and construction of a new crushing mill and grinding mill. A new 16-ton steel-shell, firebrick-lined calcining kettle also is being installed, making the fourth unit in the calcining plant. New boilers, dryers and other equipment also are being put in.

New construction and equipment at Sweetwater includes: a bag-products warehouse, an addition to the main mill, an extension of the power plant—all the new construction to be of steel and corrugated iron; a 16-ton calcining kettle, the sixth one in this plant; a rotary dryer, and other changes necessary to increase board production.

At all three of these last-named plants, the expansion of board-producing capacity is partly due to the increasing demand for "Gyp-Lap," the fire-resistive sheathing which the company put on the market last year. This product, together with "Rocklath" or "Sheetrock" and a dry-fill gypsum insulator called "Thermofill," contribute to the "protected frame" system of construction which the company has been advocating.



Pouring pits of Woodstock Slag Corp., near Birmingham, Ala.

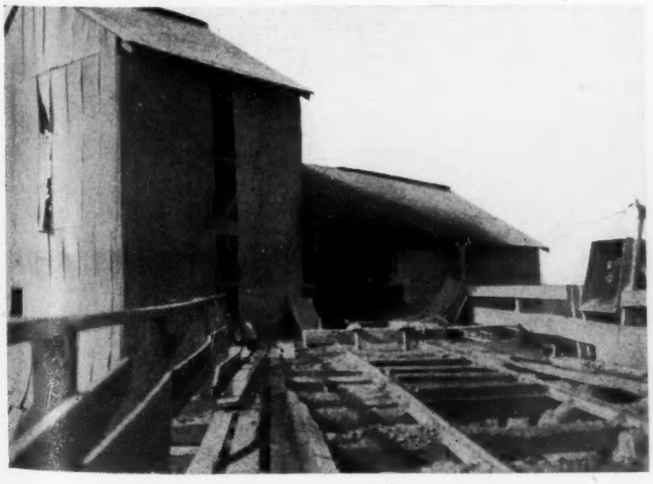
Two Plants for Handling Birmingham Slag

Woodstock Slag Corp. Has Crushing and Loading Operations at Woodward and East Birmingham, Ala.

THE Woodstock Slag Corp. operates two plants for crushing blast furnace slag near Birmingham, Ala. One of these is at East Birmingham, the other at Woodward, between Birmingham and Bessemer. The latter is the newer plant of the two and since it was completed in 1925 it is among the newer slag-crushing plants of the country.

The slag crushed is from the furnaces of the Woodward Iron Co., of Birmingham, and is unusually dense. Slag specifications usually call for a weight of 70 to 72 lb. to the cubic foot and occasional specifications call for a weight of 75 lb. This slag will weigh between 75 lb. and 80 lb. to the cubic foot.

The Woodward operation is divided into two kinds of work. One is the loading of slag to be sold as "shovel run" or riprap and the other that of crushing the slag to the ordinary commercial sizes. The loading of shovel run slag is from a bank, accumulated for some time before operations were started, and this bank is worked like a quarry. The bank is about 75 ft. high and the working face is perhaps 1500 ft. long. The slag is shot down in benches, churn drills and black powder being used, with some dynamite to



Tracks over bins at Woodward plant

Slag is shot down as in a quarry

Picking iron from slag at chute before it goes to crusher

Secondary crusher

spring the holes. The steam shovel employed might be able to dig the slag, but with a face of this height it would be extremely dangerous to attack the face with a steam shovel at the bottom. There would be danger that after the bank was undercut the top would slide down and bury the shovel. So the top 25 ft. or so is always shot down and if it appears necessary a second 25 ft. is shot. This leaves the bank with such a slope that the lower part may be attacked by the steam shovel without danger.

One of the pictures shows this bank run loading operation. The cut is called the ballast pit, because so much of the output goes for ballast. But shovel run slag has a number of other uses. A great deal of it is used in rip-rapping and a considerable amount goes into the heavier kind of mass concrete, sometimes called "cyclopean" concrete, where weight is as important as compressive strength.

Originally the face of the ballast pit was along the edge of the creek that is shown in the picture and the distance of the present face from the creek gives some idea of the magnitude of this part of the operation.

A 70-ton Bucyrus steam shovel of the railroad type is used to load the slag and the cars are regular railroad equipment. Almost all the cars used for handling slag or similar materials in the Birmingham district are the heavy steel gondolas so much used for hauling iron ore and coal in that district.

Pouring slag in the ballast pit still goes on so the operators will not cease when the accumulated slag has been shipped.

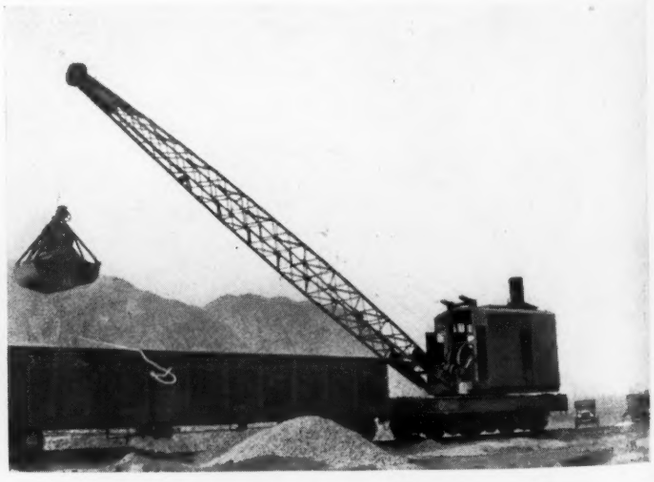
The slag for the crushing plants comes from these cooling pits, each of which is 1500 ft. long. The railroad tracks on which the trains of slag ladles run, from which the pits are poured, are set at 65 ft. centers. The slag is dug in the ordinary way (that is, without shooting it down), by a 70-ton Bucyrus shovel of the railway type. This will be succeeded shortly by an electric shovel.

The steam shovel loads the slag into standard gauge steel gondolas which are pulled into the plant by a dinky. The rails run out from the slag bank over a large and rather deep bin, which will hold about 300 tons. The lay of the ground made it possible to include this bin in the plant layout and it is a considerable advantage to the operation. If the shovel is being moved or is not working for any other cause the crusher runs on the contents of the bin, and if the crusher is down for want of cars or any other cause there is usually space in the bin to hold enough slag so that the shovel does not have to stop.

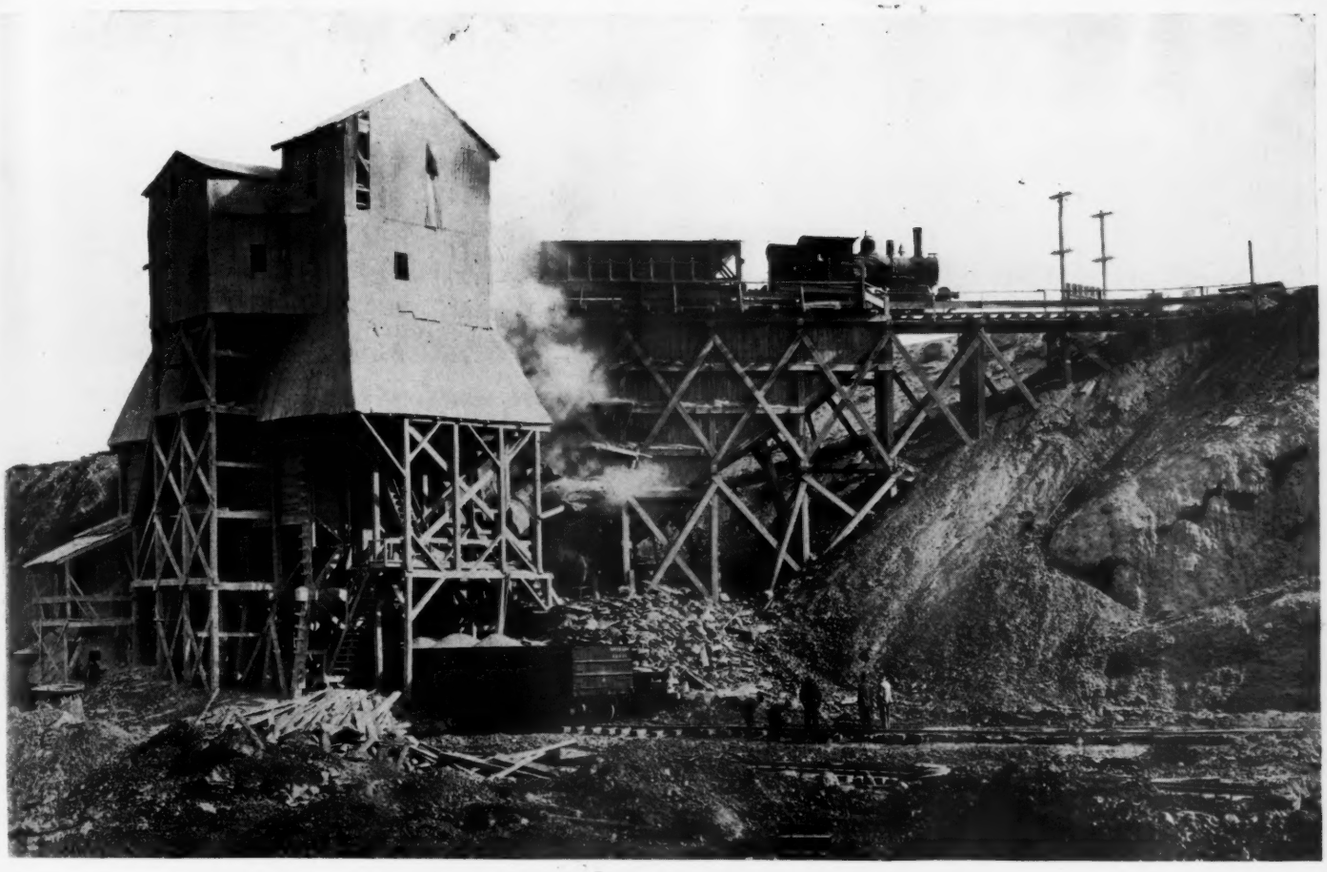
From the bin the slag flows through a chute to the primary crusher and three men are employed at the chute picking out pieces of iron. The iron comes in flat slabs and some of them are quite large. A magnetic method of separation was tried, but it was not successful on account of the size of slabs.

The primary crusher is a No. 7½ Allis-Chalmers gyratory. The discharge goes to a 30-in. close connected bucket and belt elevator with a 12-ply belt. The discharge from this elevator is split between two screens, each of which is 16 ft. long with a 10-ft. jacket. The diameter of the main section is 40 in. and of the jacket 60 in. The main section has 2½-in. and 1½-in. holes and the jacket ¾-in. holes. The oversize of the

Moving steam shovel in pouring pit



Unloading cars to stock pile



Woodward plant of the Woodstock Slag Corp.

Working in the ballast pit of the Woodstock Slag Corp.

Bank at this ballast pit was formerly at edge of creek

Pouring pits are on either side of loading track

screen is returned to the No. 7½ crusher and the larger screen sizes to bins except when they are to be recrushed. The finer sizes, including everything below ¾-in., go to two "Hum-mer" screens set below the revolving screens. These are covered with ¼-in. "Ton-Cap" screen cloth and make an oversize ¾-in. to ¼-in. and screenings, both of which go to bins.

The demand for the smaller sizes is now so strong that practically nothing coarser than 1½-in. diameter is shipped, and this is true of other plants in the district. So the coarser sizes from the main sizing screen have to be recrushed and they are sent to a No. 37 Kennedy gyratory. The discharge of this crusher goes to a 24-in. close-connected bucket and belt elevator, which lifts it to a screen of the same size and make as the main screens, except that it has only 1¼-in. and ¾-in. perforations. The oversize goes back to the Kennedy crusher and the undersize of the ¾-in. jacket goes to the "Hummer" screens.

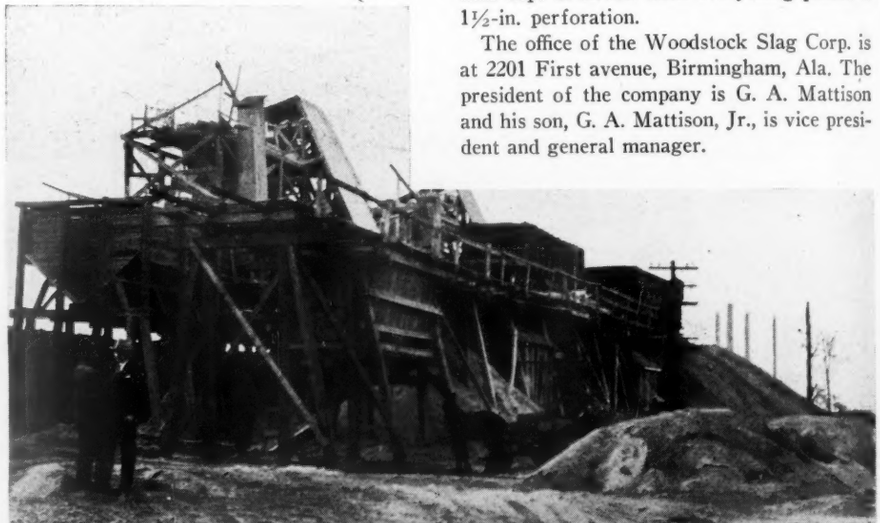
It has not been easy to accumulate a stockpile, the demand for aggregate has been so great, but one has been built up slowly and a 22½-ton Ohio crane with a 1½-yd. Hayward bucket is used to handle it.

A large proportion of the output of this plant is used in "Warrenite" and other forms of bituminous paving, which are much used in Alabama, Mississippi and Florida.

The plant at East Birmingham differs materially from the Woodward plant, as jaw crushers are used throughout. There are really two units with a common recrushing unit. The slag is taken from cooling pits as in the Woodward plant, and is sent to two 10x20-in. Earle C. Bacon jaw crushers. The product of each of these goes by a 12-in. belt elevator to a 40-in. by 16-ft. screen and the undersize of the jacket goes to "Universal" vibrating screens.

The oversize of the main screens and, at present, everything over 1½-in. diameter, goes to a 16-in. belt conveyor which empties into a bin above a No. 4½ "Champion" jaw crusher, made by the Good Roads Machinery Co. The crusher discharge is spouted to the elevators that feed the main screen and is thus kept in circuit until everything passes a 1½-in. perforation.

The office of the Woodstock Slag Corp. is at 2201 First avenue, Birmingham, Ala. The president of the company is G. A. Mattison and his son, G. A. Mattison, Jr., is vice president and general manager.



Crushing plant at East Birmingham

Main sizing screens in Woodward plant

Chutes from bin and crusher head at Woodward plant

The Growth of a Great Sand Business

How the Stewart Sand Co. of Kansas City, Mo., Was Built Up to a Monthly Capacity of Over 100,000 Tons

THE Stewart Sand Co. of Kansas City, Mo., is probably the largest "straight" sand producer in the country. It produces no gravel or other coarse aggregate—nothing but sand. Yet its production often exceeds 100,000 tons per month and it is preparing to meet a peak demand of 150,000 tons per month. It operates several dredges on the Kaw river and one on the Missouri river. It has five retail storage yards in Kansas City from which it delivers by its own fleet of trucks. It maintains garages and machine shops to look after and repair all this equipment, not only trucks, but locomotive cranes, wagon loaders, and dredge and plant machinery. Most of its equipment is electrically powered, but some of the dredges are run by steam and two have Diesel engine power.

In the early part of 1925 the company bought out its chief competitor, the Kaw River Sand Co., and passed on part of the saving effected by consolidation to its customers by lowering the price of sand. There are now 3000 names on its list of regular customers, for much of its business is through its retail yards in Kansas City. But a great deal of sand is sold through dealers in nearby towns and cities and of course there is a large direct business to highway and other large contractors in carload lots.

ROCK PRODUCTS readers have been kept informed of the various improvements and additions which have been made to the plants of this company. This story is to take up a side of the industry which trade magazines rarely present, that of business policy and management. Important as is the technical side of an industry, not even a technical man will deny that it cannot succeed on a purely technical basis. The policy of the company must be right and the management adequate to meet conditions which arise as the business develops.

An Old Company That Was a Pioneer in Introducing Modern Methods

Originally the company was formed by acquiring the Stewart-Peck Sand Co. and the Kansas City Sand Co. The Stewart-Peck Sand Co., 25 to 30 years ago was a pioneer in introducing machinery for excavating sand and preparing it for the market. At a time when most sand businesses were run on a shovel and dump cart basis, it employed one of the most famous engineering firms in the country to design unloading machinery and sand washers. It is only two years ago that the last of these unloading and stock piling machines was displaced by a modern electric crane.

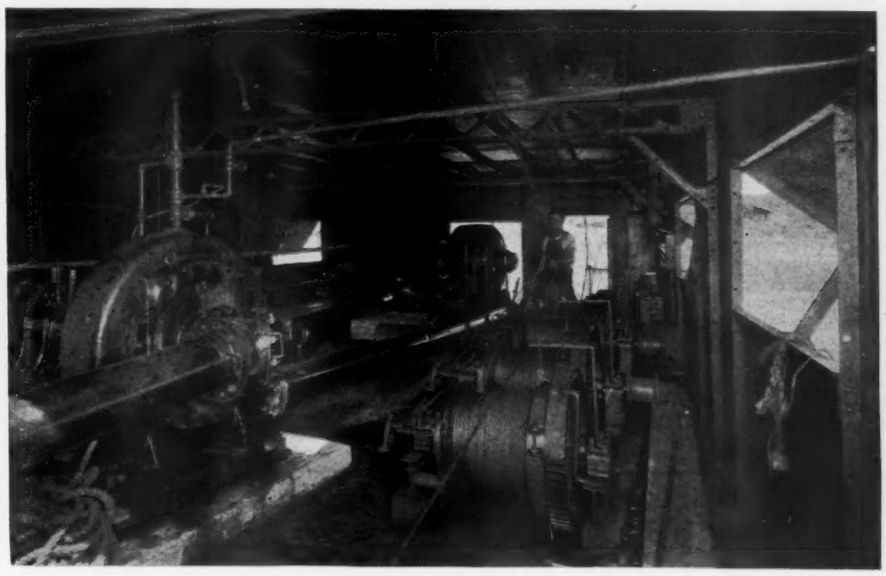
But the time arrived eventually when a complete reorganization of the company had to be effected, and it was undertaken by men who represent some of the largest financial interests in Kansas City. These men looked around for a man who had the necessary engineering and executive ability and found him in John Prince. The reader is probably familiar with the name. Many readers know him personally as a past president of the National Sand and Gravel Association. But it may be new to some of them that Mr. Prince is one of the few men who could call themselves rock products engineers. After his graduation from an engineering course in Cornell he went into cement engineering and operated and built cement plants. Then, believing that business offered a better field than engineering, he established what is now known as the Kansas City Quarries Co., with plants at Rosedale, Kan., and Leeds, Mo., and another recently built at Sharp, Mo. In other hands it has become the largest producer of crushed stone in the Kansas City district. He was engaged in this business when the offer of the presidency of the Stewart Sand Co. came to him.

THIS is the story of a well established enterprise that after years of prosperity fell into a depression but was revived and built up into a great modern business. Good engineering and technical methods did this in part, but the greater part was through good management and sound business policies.

It is an unusual story for ROCK PRODUCTS to publish, but its editors believe that more such stories should be told, not with the idea of furnishing publicity of the advertising sort but to present problems of management and policy and their solution. Necessary as are good equipment and sound engineering, these must fail if they are not properly organized and directed. The company whose history is given here was fortunate in having at its head a man who had received a thorough business training as well as an engineer's education.—The Editors.

Competent Men Selected and Placed In Charge of Departments

No man can look after the details of a large enterprise by himself and Mr. Prince has been fortunate in his assistants. W. L. Ramsey, auditor, he took from the old organization. George Cook, the company engineer in charge of production, he chose himself. Mr. Cook was a railroad engineer, a graduate of Purdue university, who had had a lot of experience in earth moving and concrete construction and all of that experience was valuable to him in his new position. J. S. Stewart, traffic manager, has a most important place owing to the large number of shipments made daily.



Interior of one of the steel dredges designed by the president of the company

Offices of the Stewart Sand Co., American National Bank Building, Kansas City, Mo. John Prince, president, in oval

Sand Producers' Problems Come with the Demand for Better Concrete

About the time the new organization got under way the engineers and builders of the country were beginning to learn something about sand. Prof. Abrams had published Bulletin No. 9 of the Lewis Institute and showed that it was possible to actually design concrete for a specified strength. Edwards' work on the surface modulus as a basis for design was also being read and commented upon. Highway departments were doing research work and making rigid sand specifications. Mr. Prince, of course, became familiar with all this and he saw that the time was coming when the man who had sand to sell must be able to say something more for it than that it was "good" sand. He must be able to give sound reasons for its "goodness."

Sand Sold on Color

It is amusing to recall how sand was sold in Kansas City only a few years ago. All the sand was dredged from either the Missouri river or the Kansas river, known to everybody but the map makers as the Kaw. Sand from the Kaw was "good" sand. In fact, Kaw river sand had a reputation that spread over a far greater area than that in which it was used. Missouri river sand was not so good. Many architects and engineers wrote concrete specifications which barred it from use. Not all Kaw river sand was considered good, however. It had to have the right *color*. The "make in" sand in the Kaw, which comes in with the high water each year, is of a bright yellow color, while the sand from the bottom is a blue-gray. Many contractors have turned down this blue-gray sand for no other reason than that the color did not please them. It has since been discovered that exposing the blue gray sand to the sun and wind in a stock pile bleaches it and gives it the same color as the "good" sand, for the two are physically and chemically identical. But in earlier days its color was considered a sound reason for rejecting or accepting a load of sand.

As regards Missouri river sand there was a real reason for putting it in second place. Much of the sand in this river is too fine for concrete aggregate and all of the sand, fine and coarse, contains lignite. If this sand were used for concrete the lignite would make its way to the surface, owing to its lightness, during the finishing, and there it would slake from exposure to the air, leaving unsightly pits. And of course such a soft material as lignite would appreciably lessen the strength of the mortar if it were present in any quantity.

Hence there were two important technical problems to be solved. The Kaw river sand had to be graded to comply with the newer specifications for a fine concrete aggregate and the Missouri river sand had to be freed from lignite. And this must be done while the business was kept going and while an organization for giving satisfactory service was being built.

Building a Business by Giving Better Service

Leaving technical problems for a moment, one may say something of the effective service which has been built up. The original companies maintained storage yards in the city and made deliveries. These yards had equipment added and better storage facilities were built. The existing fleet of trucks was augmented and the garage and repair shop brought up to date. The office force was organized and kept "on its toes," ready to see that the orders were filled as soon as possible. The other sand companies in the city got into the game and soon there was a lively competition, not in price-cutting but in service. The competition kept on until it is no exaggeration but a statement of sober fact that a contractor almost anywhere in the city limits felt abused if he did not see the truck load of sand drive up to his job within twenty minutes after he had ordered the load. Even today when competition is reduced to the lowest terms the same speedy service is maintained and the big trucks drive out of the yard almost as soon as the telephone bell has stopped ringing. Such service is appreciated. Contractors under present ordinances cannot build stockpiles on the sidewalk nor crowd the streets before a new building with too many deliveries. Hence the concern that will furnish materials when and as they are wanted is the one that gets the business.

But service alone cannot make business. The goods must have the quality. The technical problems pressed and ten years ago there did not seem to be any one who knew just how to solve them satisfactory. Some time later a series of articles on the theory and practice of sand settling appeared in Rock Products. Mr. Prince studied them and began to design sand saving appliances to conform with the principles given. Not having time to work out designs himself he called on engineering talent from the outside and new plants were designed. The first of these was at No. 6 (the company numbers its river operations from No. 1 to No. 9), where the trouble was with mud that settled on top of the sand in periods when the water backed up from the Missouri. A battery of cones with rising current water solved this problem. Then some new "tipples" (as the sand saving bins are called in this district) were designed to give the proper grading, or classification, with the flow of water from the pump. These worked satisfactorily. By changing the settling area the classification was affected so that the grading might be whatever was desired. The name "classified sand" was adopted for the product of the new plants, and the name is still used. It cost money to classify sand because it meant wasting a good deal of fine sand beside careful attention to the work. But the principal customers wanted quality and were willing to pay for it.

Solving a Hard Technical Problem

The lignite in the Missouri river sand offered a more difficult problem. It would make an interesting story to tell in detail, but it would be too long. It is enough to say that after a study in the laboratory and of methods used in coal washing a special type of classifier was designed which did fairly good work. A plant was erected and the product was so good that sales of Missouri river sand doubled the first year. Further study showed how the work could be bettered and the plant was redesigned. Still further study has brought out newer ideas and the plant has been rebuilt to have double the capacity of the first plant and to make a still cleaner product. A sand 100% free from lignite is produced for 90% of the time. In the remaining 10% a little lignite gets in, due to the fact that the proper conditions for the best working of the classifiers cannot be maintained. But this is something that is being remedied and perhaps before this article is published the goal will have been reached. For all ordinary purposes the present sand fills every requirement and a lot of it is used on finished work without showing pitting.

In addition to taking out the lignite the classifiers grade the sand to the requirements of fine aggregate and strength tests show that it is thoroughly satisfactory for this purpose. It is accepted for all classes of concrete by the state highway departments.

It was to check this work that a laboratory was installed. During all the improvement of quality a commercial laboratory had been given samples and records had been kept and curves plotted, but a laboratory belonging to the company was needed for regular testing of the work of the plant. Routine testing of all the products followed. Today even the plant foremen send in samples if they feel at all doubtful of the grading of the sand in order to correct it quickly if they find it wrong.

Finding New Markets for Sand

Improving the product brought the problem of what to do with the fine sand that had to be separated from the concrete sand. There was already some sale of fine sand for asphalt mixing, for traction purposes and so on but the market had never been seriously studied or developed. It was found that the buyers of such sand had pretty definite ideas as to what they wanted in the way of cleanliness and grading. Samples and screen test results were sent out in certain cases with the request that the customer would specify just how these could be changed to satisfy his needs. Extension of the classification idea made these changes possible and the business in special sands and fine sands grew to be an impor-

Above—The yards are filled by dumping cars from a trestle

Below—Roanoke St. yard

Center—New mixed mortar plant

Above—Grove St. yard and machine shop

Below—Yard at the foot of Grand Ave.

tant part of the whole. The plasterers, among others, were found ready to purchase in considerable quantity when they could get a sand that exactly suited their needs.

Only Half the Sand Produced Goes Into Concrete

We think first of sand as concrete fine aggregate, because so much is written and said about its use in concrete. But a careful survey of the field made by the Stewart Sand Co. showed that only half the sand produced went into concrete. The rest was sold for plastering, car bedding, for making cores, for use in locomotive sand drums, as chicken grits, children's sand piles, even for making soap and cleaning preparations. Some of the many markets found for fine sand called for only one or two cars a year, but in the aggregate these small tonnages amounted to a respectable total. The point is that *the business was organized to find such markets and develop them.*

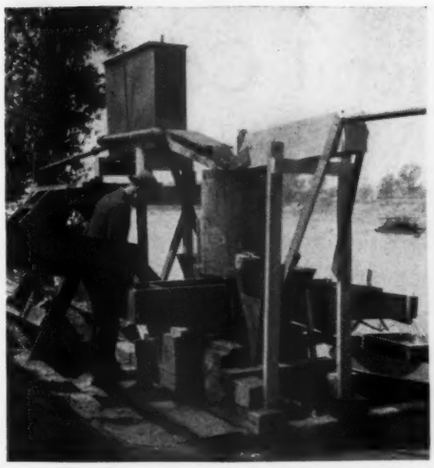
In passing one may mention the most curious use of sand found by the Stewart Sand Co. It was its use as a patent medicine. A Pittsburgh concern actually bought a carload for that purpose, which, of course, was specially prepared.

The Policy of "One Price to All"

One who has read thus far will note that the policy and management of the business had two aims, that of constantly improving the quality and that of building up the

W. L. Ramsey, auditor

service department to the highest possible efficiency. But there was a third factor in the building of the business which has been quite as potent as either quality or service, and that is the maintenance of a uniform price. It was not easy to establish this policy. As in every city the history of the sand business had been filled with price wars and secret advantages given to obtain good contracts. But the uniform price policy was maintained. The buyers who wanted classified sand and Stewart Sand Co. service had to pay for it, one the same as another. In the end quality and service and a firm price policy won, as they always do.



Working with an experimental classifier, used to solve problems in grading and the elimination of lignite

And finally one must not forget the policy of the company toward its employes. The success of this policy is indicated by the fact that many of the employes have been with the company since the day it was organized. Only those who could not help in keeping up the quality and the service—the kind who were too slow or unwilling to take on new ideas—were allowed to go. Their places have been filled by men who seem contented and willing to stay with the company as long as its present policy continues.

Employes are paid both by straight salary and wage and bonus. The bonus applies to those directly engaged in production and is based on production. It works well. The thought of bonus money is a sufficient spur to make the men watch carefully to prevent breakdowns and to jump in and fix them if a break does occur. It is worth more than the money that the bonus brings home to every man on the job—the idea that he is directly and personally responsible for production.

Of late the company has followed its policy of broadening its market by investigating those newer industries in which sand could be used. It has found an important one in the mixed mortar and plaster business and has built a plant operating the Blue Diamond process on its Missouri river location. It is probable that it may find other and similar outlets for its constantly increasing production.

Correction

IN the account of recent improvements made at the Risley Sand and Gravel Co.'s plant at Dixon, Ill., in the May 15 issue, the make of the hoist used was wrongly given. It should have read that a Thomas hoist is in use.

Marlboro Cement Company's Plant in Alberta, Canada

A CANADIAN correspondent of Rock Products writes as follows of the plant of the Marlboro Cement Co., Alberta, Can.:

"The Marlboro Cement Co. was formed 16 years ago for the purpose of manufacturing cement from marl by the wet process. With this end is view a plant was established at Marlboro, situated 140 miles west of Edmonton. The first cost of this plant was $1,750,000.

"Some time ago the construction of the plant was altered and it was found by the company that their holdings included one of the largest deposits of limestone, free of magnesia, in the province. This brought about a change in methods and the consequent manufacture of cement by the dry process commenced.

"Quarrying of the Marlboro Cement Co. is carried on at Jasper, where the company owns a modern crushing plant with a capacity of 25 to 30 cars per day. The shale deposits of the company are located at Ley- on the Alberta Coal branch.

"The present capacity of the plant at Marlboro is 1500 bbl. of cement per day, but when the demand increases, which officials of the company anticipate it will do in the near future, it is their intention to increase the capacity by 50%, and later the capacity could easily be doubled to bring the total up to 3000 bbl. per day.

George Cook, engineer

"That the Marlboro Cement Co. is valuable to the province as an employer of labor is evidenced by the fact that 90 men are working at Marlboro, 15 to 18 at Jasper quarry, and in addition there is a small crew at the shale pit. Some idea of the value of this organization to the community as a whole may be gathered from the fact that 6000 tons of coal are used every month. Between $500,000 and $600,000 worth of fire insurance is carried."

Southern Mineral Co. Starting to Burn Lime at Winnfield, Louisiana

Experimental Kiln Now Installed to Determine Value of Deposit Heretofore Worked for Commercial Stone

THE Southern Mineral Co. of New Orleans, La., works a limestone deposit at Winnfield, La., which is about 240 miles northwest of New Orleans and not far from Alexandria. It is one of the very few exposures of limestone to be found in Louisiana. Dr. Henry M. Payne in his book, "Unexplored Southern Resources," says that limestone is exposed at only three places in the state, of which Winnfield is one. Of the other exposures it is said that one is a sandy limestone containing nodules of iron pyrites and the other has been worked to a small extent for agricultural lime. The Winnfield deposit is a very pure high calcium stone which burns to a good quality of lime. Owing to the nearby market for lime, its distance from competitive points and the shipping facilities afforded by three railroads, it promises to develop into an industry of great importance to the state. At present it is worked only for crushed stone, but a lime kiln is being built which will be in operation by the time this is published.

Deposit Overlies "Salt Dome"

The deposit is peculiar. It overlies one of the "salt domes" which are a feature of this part of the state and which are being drilled for oil and gas. One well was put down on this deposit and passed through 900 ft. of limestone before getting into the rock salt below. Of course this does not prove that the deposit is 900 ft. thick, as the strata may not lay flat. The upper part of the deposit shows evidences of folding and breaking.

The stone is banded blue and white and rather soft. The white bands are largely calcite and there are occasional big holes that show crystals of spar. Mr. Jenkins, the superintendent, says that occasionally the work has run into small caves in which there were stalactites. The whole formation is such that one would judge that precipitation of limestone from solution played an important part in its origin.

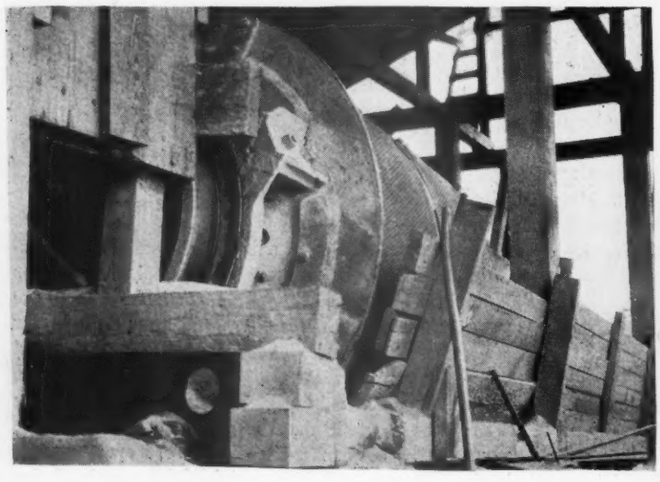
But if the rock is soft (calcite is one of the softest minerals) it makes up for it in part by having remarkable cementing qualities. This makes it desirable for road bases to be afterward covered with "black top," and this type of road is much in use in Caddo parish and other parts of the state near the quarry. The rock has proven very satisfactory as a road base. Its cementing quality is shown by a 4-in. rolled layer which is placed around the square in Winnfield, a town of 3,500. This has stood traffic practically without repair since 1918.

Well drill deepening present quarry

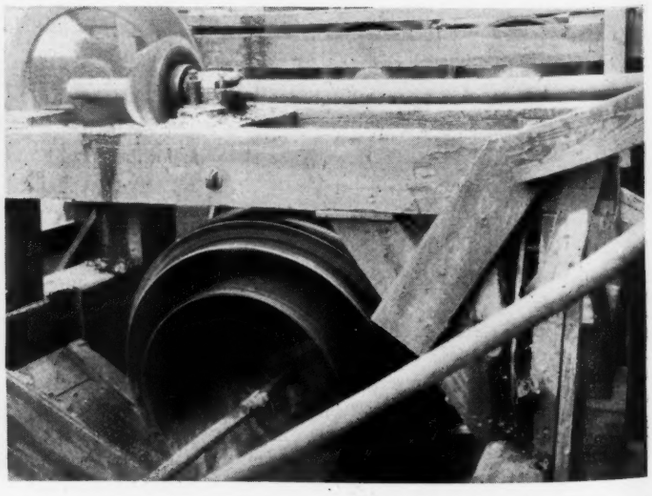
Small Kiln to Serve as "Pilot"

However, the value of the deposit will probably be that of a source of lime and to prove or disprove this a small kiln has been built. It was designed by John C. Schaffer with the same care and attention to detail that a larger kiln would be, for it is intended to serve as a "pilot" in designing a large plant. The present kiln is 5 ft. 6 in. in diameter inside and 8 ft. outside. The shaft is 25 ft. high. The outer shell is of ⅜-in. steel plate and the lining is of firebrick backed by common brick with 6 in. of cinders between the shell and the brick as insulation. The kiln will produce about ten tons of lime per day.

All the stone from this quarry has to be washed whether it is to be crushed or burned. The kiln feed is washed in a peculiar way. It is dumped into a cylinder about 10 ft. long which conveniently holds two tons. This cylinder is revolved for five minutes while a stream of water flows through it, and at the end of five minutes the stone is thoroughly cleansed. It is conveyed from the



The 24-ft. main sizing screen above bin



End of log washer and rinsing screen receiving stone from logs

Plant of Southern Minerals Co., Winnfield, La.

cylinder by an 18-in. belt to a small bin. From this bin a second 18-in. conveyor takes it to the kiln.

Wood for Fuel, and Natural Gas Later

The operation of the kiln is as nearly continuous as is possible in a furnace of this size. Wood, a mixture of pine and oak, is used as fuel and the company has a large supply on its own land. It is expected that natural gas will be used in the large kilns, which are to be built, as gas is very abundant in this party of the country.

The deposit is so broken at the upper part that it is worked as four quarries, although No. 2 and No. 3 have now run into one another. Both hand and steam shovel loading are used. Two Marion shovels, a 60-ton and a 20-ton are in use, both of the railroad type. Ingersoll-Rand jackhamers are used at present, but a Sanderson-Cyclone well drill is on the ground and will be used to deepen the quarry.

The present face is 30 ft. high. A test pit put down for 30 ft. in No. 4 quarry showed hard, firm stone all the way and it is expected to go to that depth in future workings. Pumping is one of the features of quarrying this deposit. In the wettest weather a 10-in. centrifugal pump is used, with a capacity of 2400 g.p.m., and this keeps the ground clear by working intermittently. In ordinary weather a 4-in. "Lucy Special" pump, running constantly will do the work. However, the water is no disadvantage in this case, as water for the washing plant has to be pumped anyway.

The rock is pulled up an incline to the plant by a 12x14-in. Lidgerwood single drum friction hoist, steam driven. It is dumped down a chute over a grizzly of rails set 2 in. apart at the top and 3 in. apart at the bottom.

Primary crusher and grizzly which separates material to be washed

The oversize goes to a No. 9 Gates-Allis-Chalmers crusher. The undersize, which contains practically all of the dirt and clay that comes from the quarry, goes to a double log washer.

Method of Washing

The log washer is of the old type with wooden logs to which shoes are fastened in which the blades are held by bolts and wedges. It gives a great deal of trouble by bolts coming loose and blades coming out, and it will be replaced by a washer of a modern type.

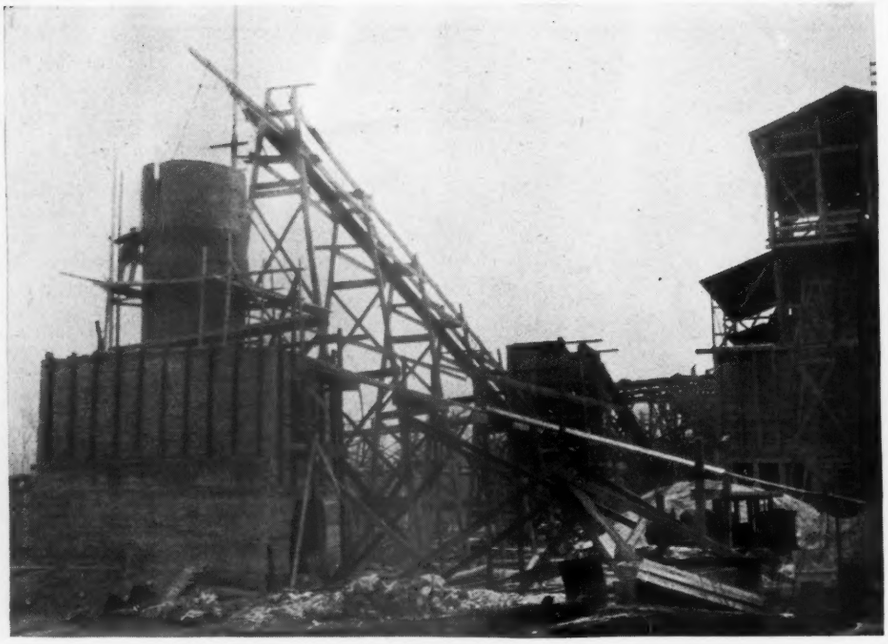
Since the plant was visited the company writes us as follows:

"We have purchased a rotary kiln shell, 60 ft. long by 6 ft. in diameter, which we are converting into a washer. This, we believe, will handle 1000 tons a day. When installed we intend to set grizzly rails 8 in. apart and when large lime plant is built the stone from the primary crusher will also be run through this washer."

The crushed oversize goes to a scalping screen with 2¾-in. perforations. The oversize is split between a No. 5 and No. 6 Gates crusher. The undersize and the discharge of this crusher go to the main sizing screen of the plant which is situated above the plant bins. The crushers are set so there is practically no oversize but oversize may be returned to the No. 5 crusher.

The product of the washer goes on a 30-in. conveyor belt to the No. 5 crusher and from that to the elevator of the main sizing screen.

Boulders of limestone are embedded in a clay matrix



New lime kiln under construction and trestle for conveyor to feed it

The sizes made are: Screenings, from ⅜-in. down; No. 3, which is through ¾-in. and on ⅜-in.; No. 5, which is through 1¾-in. and on ¾-in., and No. 8, which is through 3-in. and on 1¾-in.

Plant Is Steam Driven

The whole plant is steam-driven. There are two 100-h.p. boilers and one 150-h.p. boiler, but only the 150-h.p. boiler was in use when the plant was visited. Most of the machinery is driven by a Lane and Bodley 20x60-in. Corliss engine. A 14x18 Chandler and Taylor engine drives the No. 9 crusher and one elevator.

A Byers "Auto-Crane," steam driven, is used for keeping ditches clear, handling waste and other jobs around the plant to which such a machine is adapted.

The plant has a fairly complete machine shop with a lathe, drill press and all the equipment needed for making ordinary repairs.

I. L. Lyons of New Orleans is president of the company. He is a well-known New Orleans business man, at the head of the I. L. Lyons Wholesale Drug Co. J. M. Jenkins is superintendent.

The great market for lime in the locality is made by the paper mills.

Present paper mill consumption in the vicinity totals about 100 tons daily. Two mills are doubling capacity and a new large mill is in prospect, so that indications are that the market for paper lime alone will in a year or two exceed 200 tons daily.

A Canadian Phosphate Project

DEVELOPMENTS of an extensive phosphate industry in British Columbia are forecast for the near future, as the result of prospecting activities already in progress, and in which the Consolidated Mining and Smelting Co. is understood to be interested. The prospecting activities are being carried on in the East Kootenay district, where large deposits have been reported.

Legislation passed at the last session of the British Columbia legislature will facilitate development work. Before last year it was impossible for prospectors to stake out claims large enough to make development worth while. Now it is legal to stake claims one square mile in extent.

Sulphuric acid is at present a waste product at the Consolidated smelter at Trail, B. C. An outlet for this product in the manufacture of fertilizer would prove a great economic saving for the company and would at the same time help materially to put the phosphate industry on a sound basis.

At the present time Canada imports large quantities of phosphates from the United States, and the need will undoubtedly grow in the next few years.—*American Fertilizer.*

It is from this quarry that stone is being taken for lime plant

High Spots in the Proceedings of National Lime Association Convention

Round Table Discussions by Technical Men Show Need of Applying Science to Lime Manufacture—Opportunities for Lime

CHEMISTS know that the temperature and time of burning limestone have important bearing on the physical qualities of the resulting lime, which vastly affect its marketability for certain industrial purposes, such as the rate of solution of lime, the rate of settling, its plasticity, causticity, etc. Application of this knowledge to the manufacture of lime to have especially desirable properties for the purposes intended is only partly, and almost invariably, crudely attained. Consequently, it is truly recognized by lime technologists that the science of lime-burning is in its infancy, despite the fact that the art of lime-burning has been practiced for several thousand years.

Every discussion of lime-burning by the technologists who are working for and with the National Lime Association is pregnant with valuable information, but seldom with such practical information that it can be immediately applied by non-technical lime manufacturers. This was true of the round table discussion on lime manufacture at the recent French Lick convention of the association. Attempting to analyze the discussion for data of immediate practical value to lime manufacturers does not result in a long list, but the following are important:

(1) Parts of a lime kiln subjected to temperatures of 1600 deg. F. and above should be insulated, in the interests of efficiency and economy.—Prof. R. T. Haslam, Massachusetts Institute of Technology.

(2) All the purposes of steam in gas-producer operation for lime-burning may be fulfilled by the use of CO_2 (carbon dioxide) gas pumped from the exhaust of the kiln stacks.—Victor J. Azbe, consulting engineer, St. Louis, Mo.

(3) There is always a greater loss of heat in lime-kiln operation than can be theoretically accounted for; where does it go? After all, do we know all the chemistry of lime-burning?—Victor J. Azbe.

(4) The best temperature for burning all-around good quality lime is about 2000 deg. F.; most kiln temperatures are higher.—Prof. Haslam.

(5) A hard-burned (overburned) lime may have desirable qualities for certain purposes. —Prof. Haslam.

New Types of Lime Kilns

H. Miscampbell, kiln manufacturer and lime plant designer, Duluth, Minn., submitted by correspondence a shaft-lime-kiln design, the distinguishing feature of which was a series of interior baffle plates to keep the stone from packing and choking the draft. (Tower dryers are built along similar lines.) The idea was that in such a kiln small sizes of stone could be successfully burned. The general consensus of opinion was that baffles could not be designed of any present-known materials, which would stand up under lime-kiln temperatures for any length of time.

The tunnel type of kiln and its possibilities for burning limestone was a subject which aroused much interest, but definite information could not be supplied by any one present. T. P. Black, of the Black White Lime Co., Quincy, Ill., has had experiments made in a tunnel kiln of the type described in Rock Products, October 3, 1925, and seemed convinced that there were possibilities. Irving Warner, vice-president, Charles Warner Co., Wilmington, Del., pointed out that many experimenters and theorists in lime burning overlooked the fact that this is an endothermic reaction (heat-absorbing) and not merely a matter of designing a machine,

G. B. Arthur, general manager National Lime Association

or device, to withstand certain high temperatures, as is the case in the manufacture of clay products. Limestones must not only be subjected to high temperatures, but held at these temperatures for a long period to be calcined.

Uses of Lime

The second round-table discussion at the convention was on the uses of lime. The growing use of lime for the treatment of trade wastes, and the great future possibilities in development along this line, were interestingly described by Dr. James R. Withrow, Ohio State University, Columbus, Ohio. One of the most interesting of trade-waste disposal problems is in connection with coal-mine operations. A recent supreme court decision in Idaho requires a mining company to restore a stream into which it discharges its waste "to pristine purity." The present tendency in sewage disposal, Prof. Withrow said, was wholly toward biological treatment, but in the case of trade wastes it is toward chemical treatment, and in chemical treatment lime plays an important part. However, results with lime treatments have varied much according to the particular lime used, and Dr. Withrow especially warned against conclusions being drawn because of a lack of knowledge of limes, and the special properties different limes may have.

Dr. G. J. Fink, head of the chemical bureau of the National Lime Association, gave demonstrations of the effect of lime in the treatment of various trade wastes, including creamery wastes, tannery wastes, etc.

The problem of successful industrial waste treatment is to convert the wastes into useful products, if possible. Lime-treated sludges nearly always have some fertilizer value, if the sludges can be economically handled and applied.

Reburning Pulp Mill Sludge

The practice of some of the pulp and paper mills of reburning the lime sludge waste to make lime for use in their process has caused some concern to the lime industry. It seems, however, from a very thorough investigation made by Robert H. Kean of the National Lime Association, and D. E. Washburn, chemist of the American Lime and Stone Co., Bellefonte, Penn., that with each reburning of the sludge 3% of impurities are added to the resulting lime, and the lime grows steadily blacker in color.

Hence, after about six successive burnings, the possible available lime is so much decreased that it is of little use—the available lime is reduced from 94% to 74% in two burnings. There are possibilities of using this sludge, after it has been dried, in other ways, so that there is little likelihood that there will be any considerable spread of the practice of lime reclamation by the paper and pulp industry.

J. M. Porter, of the U. S. Bureau of Standards, Washington, D. C., made a special plea for lime manufacturers to obtain a more accurate knowledge of their own material. He said he was frequently called upon to supply sources of lime having certain physical or chemical characteristics, and that he had found that lime manufacturers themselves seldom knew even the fineness of their hydrate, for example.

Opportunities for Lime in the Industrial Field*

By L. B. Burt†

SPEAKING from the standpoint of field activities in the broadest sense, the opportunities for lime promotion are wonderful, although not entirely sanguine. From the standpoint of the lime manufacturer some of the features classed as opportunities for field work by an association man would more properly be classified as urgent necessities. But the latter distinction is for the manufacturer to determine and we shall confine ourselves here to the work in hand as the function of an active promotional organization.

We must look to our fences at all times. There are active sales organizations whose efforts tend to displace lime, and who have easy sailing because they meet with no resistance from the lime industry. There is need for keeping in touch with uses that are supposedly well established because there is no way of guessing when an important development may seriously affect the status of lime. There is need at all times to push the frontier forward by uncovering new applications, fostering and helping new and efficient methods of its introduction in industry.

Constant Vigilance Necesary

The application of lime in an industrial process is not mixed with sentiment. It is used only so long as it is the most economical, or indispensable material. As compared with any other chemical possessed of like properties, lime has economy heavily in its favor, but that is not always the prime consideration. There are cases conceivable where lime may be displaced by other means, plus salesmanship. The combination, while not formidable, calls for combat. To offer no opposition is to surrender. To be specific, in the sulphite pulp industry the Jennsen limestone tower has made heavy inroads on lime tonnage. If there had been properly directed effort that could show without much difficulty that the milk of lime system operates at no greater cost than the tower, the cost of installation of the towers would have acted as a powerful argument against the change. But no such work was in the field and the towers lifted their heads all over the paper pulp sections. As a matter of fact, being on the defensive is better strategically, but the lime tonnage so lost went without a struggle.

Defense against such inroads must be built up to suit the case. Consider the frontal attack via the soda and sulphate pulp mills. The arguments seem pretty strong as they are presented by the makers of the sludge reburning equipment. Savings are claimed on the score of lime cost, labor saving said to be effected by an automatic continuous causticizing plant, furnishing white liquor continuously instead of intermittently, and the solution of the stream pollution difficulty, a subject actively before all state boards of health. The estimated savings indicate a justifiable investment. Now there we have a problem facing us squarely and there is no dodging of the issue. If that were the whole story it would be our cue to strike our tent and decamp as gracefully as possible. But there are some things with which we can make the enemy slow up and we will consider these now.

Reburning of sludge requires a dewatering and filter pressing operation ahead of the burning. The burning itself, according to dependable information, is carried on at a costly fuel ratio, much higher than lime manufacturers could stand, and the product obtained is progressively lowered in quality due to the constant accumulation of impurities with each reburning. Labor saving credited to the continuous causticizing is purely a mechanical improvement which can be gained independently of the reburning. Two manufacturers are carrying on experiments of dewatering and sludge removing apparatus that hold interesting promise. As for sludge disposal polluting public streams, there is already in commercial operation a profitable means for converting the sludge into a high grade paper coating material which should be much more attractive from a business standpoint than inferior lime, becoming progressively more so.

This indicates one of the big opportunities for field work, and perhaps an urgent need on the part of the lime manufacturers. A recent flurry in the straw paper field was caused by a group of strawboard mills that combined in the support of some research work started at the Forest Products Laboratory and continued in an especially equipped laboratory at Quincy, Ill., to displace lime with a sweeter smelling cooking medium. To be more nearly correct, the product they aimed at was intended to overcome the livery stable odor in cold storage eggs. They have met with discouragement thus far, but we have good reason to see that the failure was due to its excessive cost rather than to any intelligence exercised in the lime-using methods extant. There is need here to look to our fences. It may seem that a disproportionate amount of time is devoted to the subject of paper, but paper consumes more lime than any other single product in the industrial field, with the possible exception of steel, but much of the lime used in metallurgy is produced by the users. Before leaving the subject of paper, it would be interesting to run down the reasons for the switching of rag cooking from lime to soda. In the abstract it does not seem logical that it should be a saving to buy caustic soda instead of lime and then run the spent soda into the sewers.

Along the same line it is our business to learn why all soap makers excepting two or three very large ones insist it is cheaper to buy fresh caustic soda than to recausticize with lime. Perhaps this is overlapping on the province of the research department, but a certain amount of overlapping is necessary for effective co-operation. Overlapping in discussion protects against overlapping in field research and field promotion.

The subject of lime in glass making is best discussed 'in lodge." To drag a glass master out into the open for a frank discussion of costs is a job in itself. To find one that will admit there are other cost factors entering into it than lime vs. limestone is another job. But this much is certain; while they will not concede a thing about the importance of color, yield, fuel or control, a regular campaign insisting upon those claims cannot fail to bring returns.

It seems good to find a sector that is safely ours. The leather industry comes pretty close to being that. At times we encounter a substitute for lime in the dehairing of hides, particularly sodium sulphide sold under a trade name. This material destroys the hair and it does not plump the hides as well as lime does. Hair has a market now, hence the competition is not serious in that field.

Lime for Open-Hearth Furnace Flux

Since learning that the high phosphorus iron in the Birmingham district is made into open hearth steel with a maximum phosphorus content of 0.02% by means of fluxing with burned lime, we feel more strongly convinced than ever that burned lime should

*Presented before the Eighth Annual Convention, National Lime Association, June 8-11, 1926, French Lick, Ind.

†Manager Industrial Department, National Lime Association.

be advocated as flux in all open-hearth furnaces for steel making. While the largest steel makers run large lime plants to supply their own needs, many steel plants not large enough to warrant such measures are good prospects. However, they can only be converted after real trial runs in their own furnaces. In urging trial runs it must be insisted that the furnace be run at capacity with each type of flux, the heat drawn when ready rather than at equal lengths of time. The time factor should be the determining economic consideration, while the degree of refinement should also be noted, i. e., that phosphorus and sulphur are more uniformly reduced. Subsequent rolling properties are also better when lime is the flux. That seems to be the most important possibility for gaining lime tonnage in the steel industry.

Another item that should be heard from as soon as some mechanical details are thrashed out for the crushing of lumps formed as waste at galvanizing vats will be the recovery of zinc. This will be done by first treating the crushed or ground waste with hydrochloric acid, forming zinc chloride, then with milk of lime, forming calcium chloride and zinc. Work along this line has been attempted in a zinc smelter at Henryetta, Okla., but they failed to get an appropriation from their New York office for a crusher and the attempt lost momentum. It will, however, be carried on.

Water Softening

Water softening has been quite fully discussed at previous conventions. The subject is one that carries with it a strong temptation to go into lengthy enumeration of gains all along the line. As an opportunity it has been exploited by such leaders in the water treating field as Hoover, Bardwell and others. All we need to add at this time is that it looks better today than it ever has before. In the past three years municipal water softening with lime has more than trebled. There are plans on the boards today for at least five additional municipal plants and perhaps twice that number projected. On the railroads, installation of new water softening plants is a regular program with nearly all the important systems traversing hard water territory. There is room for profitable promotion work on 14,000 miles of road, operating over 3700 locomotives where no softening equipment has been built to date. Work is in progress on officials of these roads and the status varies all the way from total indifference to complete conversion. In the roads listed under the proposed Van Sweringen merger, prospects are among the brightest. In municipal water purification progress is slow compared with the foregoing, but the field is large and while the units of lime consumption are not heavy, based on the million gallon dosage, the aggregate is worth working on. Results obtained at Toledo, Omaha, Quincy, Denver, etc., indicate that a small addition of lime cuts the alum requirements in half. This carries a strong appeal to all waterworks chemists, and although the method seems to be contrary to established flocculating reactions, it seems to do the work at the places named, with all year round consistency and an improved bacterial removal.

Perhaps the most active subject before the national and state health authorities today is the protection of public water supplies from pollution. The treatment of domestic sewage, from the present at least, seems to be best handled by biological methods. To take any other position would be to contradict the entire sanitary engineering profession. But trade wastes are becoming recognized as chemical problems. We are about to witness some real progress along that line, and toward that end we have established friendly relations with the state sanitary engineers of a dozen states. The lime industry can make a worthwhile outlet of this opportunity, the scope of which is hard to estimate.

Lime in Oil Processing

One very interesting solution along that line is reported from an oil property in Oklahoma. In that case the state authorities complained of the brine discharged into a river. A chemist tackled the problem, the result being a separation of the brine from the oil, evaporation and a lime treatment, producing calcium chloride and sodium chloride. When completed this plant will produce liquid chlorine, epsom salts and caustic soda. Inasmuch as salt water is commonly discharged into streams from most oil fields in the Mid-Continent states, such a scheme has the possibility of wide application, with a substantial lime tonnage. Active progress of interest to the lime industry is being made in the anthracite coal field, creamery wastes and tanneries. The opportunities are not even scratched, but as said before, they will be pretty much what we make them. Wherever possible, a waste should be worked into a byproduct of some commercial value. The growth of the sand-lime brick industry has much meaning for lime manufacturers. Not enough importance has been attached to this outlet. With an effective organization in the promotional field assigned to construction uses, it would not be amiss to consider pushing sand-lime brick as against common clay. It may seem a bit remote for us to push casein glue, but it should be borne in mind and any opportunities to do so not wasted. The time is not ripe for opening up on this subject of oil refining, but we hope that before many weeks we shall feel free to plunge into a vast industry that is untouched by the purifying effects of lime.

A Wide, Wide Field

Since it would be impossible to do more than briefly mention a few outstanding subjects in a paper of this kind, the purpose is to define the nature of the work to be done and the scope of the field, and from these to formulate an idea of the talent required. It can be seen that many industries will lead us into consideration of processes, diversity of products and byproducts. It is difficult to impart verbally the magnitude of the opportunities in the industrial field, but this much is certain, the opportunities are such as warrant and demand real work for their exploitation by a selected, rounded out personnel, backed up by laboratory and field research and supported by strong publicity work.

Fuel for Oil and Gas Engines

INTERNAL combustion engines are so much used today in the rock products field (both in locomotive and stationary types) that the problem of a future fuel supply is important to the whole industry. Ill-considered newspaper articles and oil geologists' reports have tended to cause some uneasiness as to the continued availability of fuel for such engines at a reasonable price. It is therefore reassuring to find an article by James O. Lewis in the June issue of the *Compressed Air Magazine* which tells us that users of oil and gas engines need not worry about future supplies of fuel. Mr. Lewis should know about the matter, as he has been chief of the petroleum division of the United States Bureau of Mines. The article is in part a paper delivered before the Franklin Institute.

Mr. Lewis admits that if we had no other resources than the flush pools from which most of our present supply comes the situation might be alarming. But we have other resources which we are just beginning to value properly. As the flush pool production declines these latent resources will come more and more into production.

The first of these resources is the foreign fields, notably those in South America, which have hardly been scratched. We are already importing large quantities of oil and we shall increase our importations as more oil is needed.

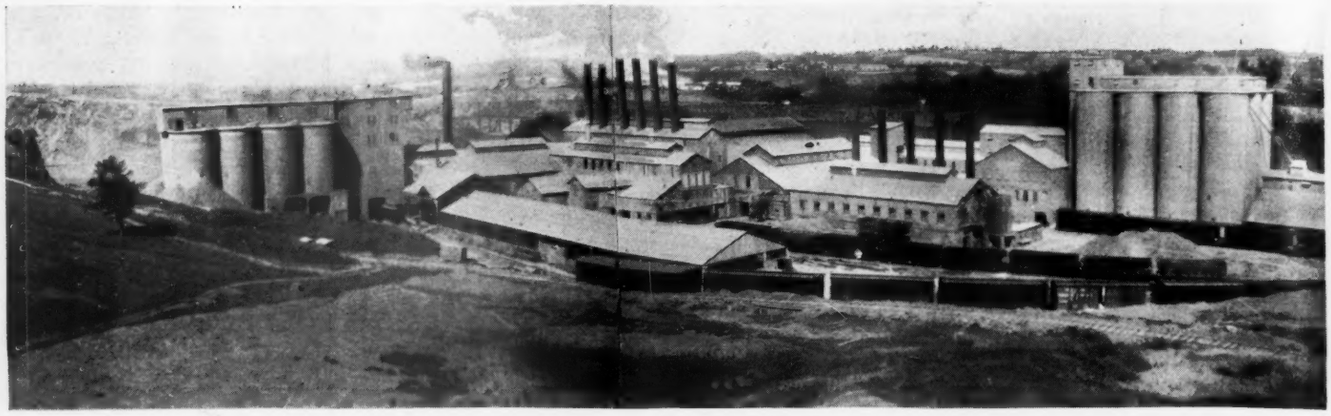
Methods to Get Greater Recovery

The next is the further adoption of methods already in use to get a greater recovery of oil from the ground. This will give us a stable, moderately priced supply for many years to come. Three to nine times the oil already taken out of our oil fields remains in the ground and much of it is recoverable.

Oil shales are the largest potential resource. They contain a vastly greater quantity of oil than the known oil lands from which our present production comes. Oil from shale will cost more than oil from flush wells, but it will not be excessively high.

The low temperature distillation of coal is already being practiced and is a source of fuel for gasoline engines. It is expected that this will provide additional fuel in the future.

Mr. Lewis concludes that the oil engine will be one of the last prime movers to be forced out of service.



General view of Reliance mill, Giant Portland Cement Co., Egypt, Penn.

Rebuilding Reliance Cement Plant

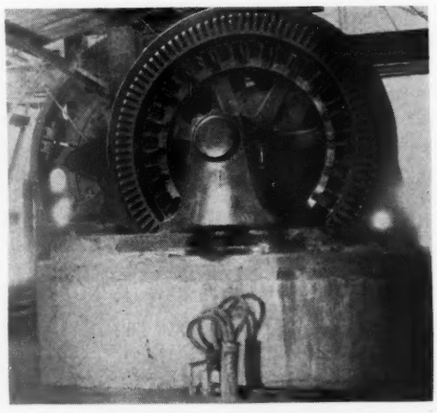
Giant Portland Cement Co. Thoroughly Modernizes Its Mill at Egypt, Penn.

By D. C. Findlay
Industrial Engineer, Allentown, Penn.

ALL cement mills built many years ago are finding it profitable to rebuild on account of the progress made in the art of cement making and the introduction of new machinery. This article deals with the changes that have been made in the Reliance mill of the Giant Portland Cement Co., which is at Egypt, Penn.

Originally, the mill was driven by several large Corliss type reciprocating steam engines, through rope transmission, and long lines of countershafting, with belts to the various small units. All the machinery is now driven by electric motors.

The original crushers were small gyratory units, which required breaking up the rock in the quarry to small pieces before it could be crushed, and this department was the first to be rebuilt. A modern crushing and storage building was designed and built during 1919 and 1920, which is capable of crushing about 250 tons per hour.

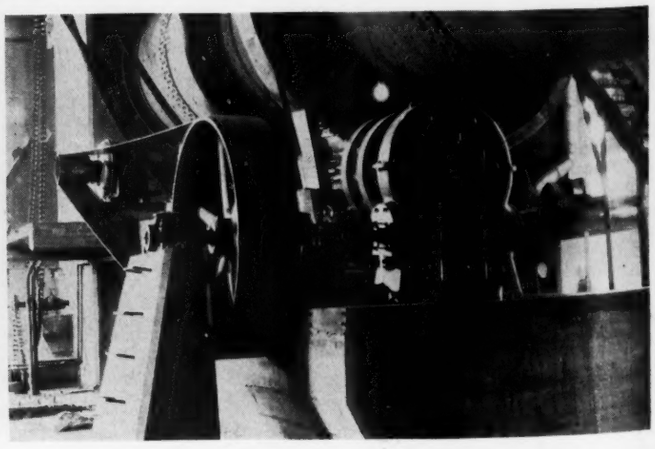


Synchronous motor of 500-hp. capacity driving tube mill

The materials used in making cement in this mill consist of two rocks, a cement rock, which is quarried adjacent to the mill, and a high lime rock from a separate quarry, about two miles distant. The cement rock is loaded by steam shovels into side dump type skip cars, which are hauled in trains to the crusher, and are dumped by means of an electrically operated hoist, directly into a hopper over a Traylor-Sheridan grizzly feeder, serving a 48x60 in. Traylor jaw crusher.

A Link-Belt continuous steel bucket elevator with 48-in. buckets elevates this preliminarily crushed rock and delivers to a Jeffrey 42x48-in. ball-bearing pulverizer, which breaks it down to 2-in. or smaller, and this product feeds into a Link-Belt Peck carrier with 30x36-in. buckets, making the complete circuit of the structure and elevating

Distributing conveyor in monitor of stockhouse



Worm gear drive for rock dryer

and conveying into any of the eight concrete silos, 26-ft. diameter, or their interstices, the whole having a capacity of about 10,000 tons.

Lime rock, which has been previously broken down in a small preliminary crusher at the other quarry, is dumped from hopper-bottom railway cars directly into the elevator feeding the hammer mill, and from thence its path is the same into two silos reserved for limestone. A Merrick "Weightometer" weighs all the material in transit, and provides means of determining the exact quantity of rock quarried and crushed daily.

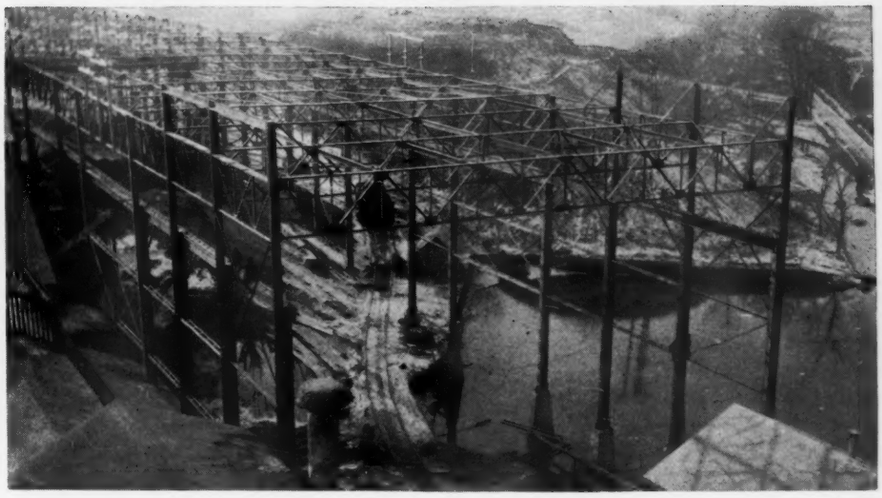
Reciprocating feeders placed under each silo allow the withdrawal of these two rocks as desired into the lower run of the Peck carrier, and just before reaching the loading spout from the hammer mill a stationary dumper trips these buckets into a chute leading to a Jeffrey steel elevator of 96-ft. centers, delivering into a concrete bin with a central partition, one side of which holds limestone and the other cement rock. A Toledo scale and steel hopper holding about 6500 lb. is located under the bin, and the proportioning is done by weighing out the necessary proportions of limestone and cement rock, and discharging them into a lower hopper, out of which the mixture is fed uniformly by a feeder into an inclined bucket elevator serving the rock dryer.

The original dryers, being too small, were replaced by a single large dryer 8 ft. diameter by 80 ft. long, with a high setting to permit discharging directly into a Jeffrey hammer mill for further reduction, and from it directly to a steel elevator feeding into a steel bin serving the preliminary grinding mills. The rock dryer is fired by pulverized coal blown through a 5-in. pipe line from the front end of the kilns some 225 ft. away, and additional hot air is blown into the dryer by a fan exhausting from the kiln stack chamber. The dryer is capable of handling about 55 tons per hour, and is driven through a Cleveland worm gear.

The preliminary grinding is done on two Bradley Pulverizer Co.'s gear driven mills, direct connected to 300-hp. synchronous motors, through Cutler-Hammer magnetic clutches, and the product of these mills is delivered to a large steel bin, which originally served 12 small Griffin mills, in this department. Under this steel bin is placed a mixing or blending conveyor, which allows the circulating of the material from the bin, and mixing with the mill stream.

To find space to erect the tube mills it was necessary to place them to one side of this steel bin, and they are fed by screw conveyors from under this bin.

One tube mill is 7x26-ft., built by the Traylor Engineering and Manufacturing Co., and driven by a 500-hp. Allis-Chalmers motor, with a synchronous speed of 180 r.p.m. through a magnetic clutch. The other tube mill is a No. 20 F. L. Smidth unit, and has a 400-hp. Allis-Chalmers motor with Link-Belt silent chain drive. Both tube mills are lined with silex blocks, and discharge into an 18-in. screw conveyor under the mill floor, and deliver to a steel elevator feeding the kiln boxes.



Clinker storage, 620 ft. long, covered by traveling crane of 80-ft. span and carrying 3-yd. bucket

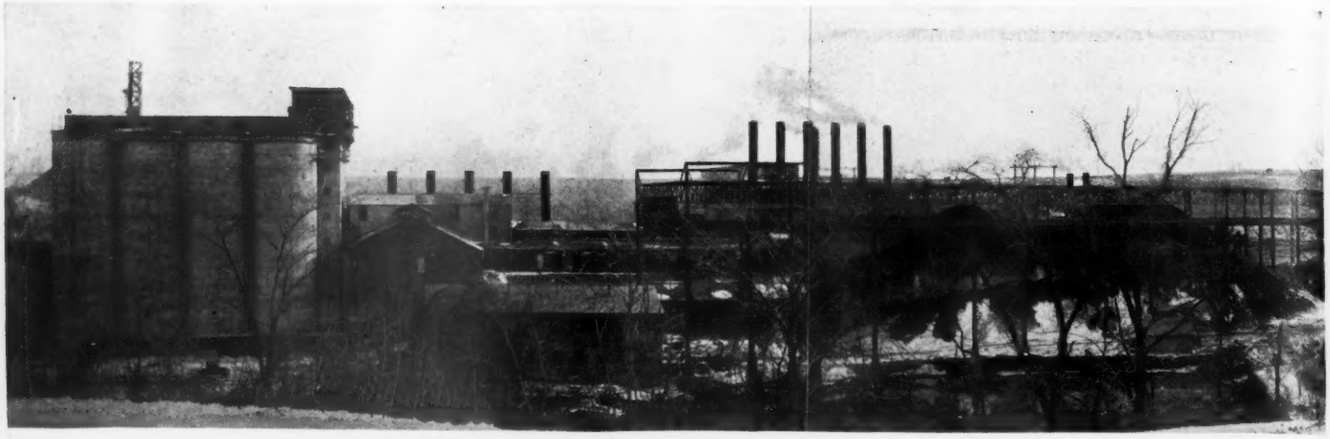
The kiln boxes are over the ends of the six kilns, which are 7 ft. and 7ft. 6 in. by 125 ft. and which are fired by pulverized coal. The clinker is elevated by bucket elevators over a concrete retaining wall into an open clinker storage served by a Whiting traveling crane with a 3-yd. clamshell bucket and having a runway 620 ft. in length with an 80-ft. span.

This open storage supplanted old vertical coolers, and provides for seasoning of the clinker. The original line shaft drives have been done away with and individual motors put on each unit in this department.

The same crane which handles the hot clinker into storage also brings back cold clinker and dumps it over a short clinker drag chain conveyor, running at right angles, into the clinker grinding department. This department originally contained 18 small single roll Griffin mills, together with preliminary crushers, all driven by a complicated system of rope, belt and line shaft transmission through friction clutches. All this has been changed, and the small mills removed, converting this space into an inside clinker storage room. The entire grinding is now done by two Bethlehem 3-roll, gear-driven mills, made by the Bethlehem Foundry and Machine Co., each mill being direct-connected to a 350-hp. 400-r.p.m. General Electric Co. super-synchronous motor through a flexible coupling.

The clinker from outside storage is delivered by the short drag conveyor to the lower run of a long drag conveyor of manganese steel. This conveys it in a trough lined with white iron blocks, which passes below the floor line and between the two mills and delivers at the bottom corner turn into a vertical steel bucket elevator. This, in turn, elevates the clinker and delivers it to the top run of the same drag chain, passing over the top of the large steel bin, of about 2000 bbl. capacity, which formerly served as the feed bin for the old Griffin mills. In this manner the Bethlehem mills always get full feed, and any excess goes on into the steel bin, from which it can be reclaimed into

Three-roll gear-driven mill for grinding clinker



In this illustration can be seen the stockhouse, office, kiln building, clinker storage, crane and coal mill

the lower run of the drag and sent around over the mills again.

The extreme end of this bin is partitioned off for 8 ft. to form a gypsum bin, and the gypsum is elevated into it, in the same manner as the clinker is handled.

The clinker flowing through the feed spouts of the Bethlehem mills is metered by a Havard spiral meter, and this meter operates a worm gear train, which actuates a make-and-break contact device, lighting a lamp every time that 10 bbl. has passed through. This is a signal to add gypsum, which is performed mechanically by the starting and stopping of a small gypsum conveyor, actuated by the impulse from this contact maker, discharging a definite amount of gypsum on the feed table of the mill itself.

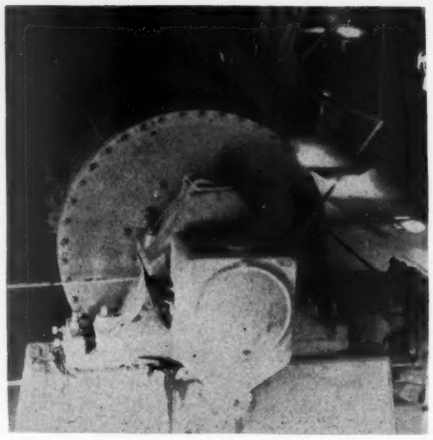
The preliminary ground material from the Bethlehem mills is conveyed and distributed into a large steel bin serving four tube mills, each being driven by its own direct connected motor, while the feed screws of each mill are separately driven by small D. C. variable speed motors, allowing accurate control of the feed to the mills.

During the fall and winter of 1925-1926 a new silo stockhouse was built on the site of a portion of the old wooden rectangular bin stockhouse.

This new stockhouse consists of 12 concrete silos, 26 ft. in diameter by 80 ft. in height, with a basement having a flat slab roof, supported on rectangular columns, and it is built in four rows of three silos each. The cement is gathered from the tube mills by right and left hand conveyors and elevated into a monitor, where it is delivered to either of two longitudinal 18-in. conveyors. Under the silos are four 18-in. conveyors, which tap from three silos and their interstitial bins and deliver into a longitudinal conveyor, which takes the cement to the packing house.

All motors in this structure are of Allis-Chalmers manufacture with Timken roller bearings.

Palmer-Bee gear reducers are used throughout, and have outboard bearings, and are also equipped with roller bearings. All



Discharge end of tube mill in raw grinding department

conveyor drive ends have Dodge Timken roller bearings. A dust collector system has been installed in the clinker grinding department, and this also provides ventilation for the Bethlehem mills. The stockhouse is served by a Barnard and Lees continuous belt manlift, as well as by a system of steel stairs in the annex.

Power is purchased from the Pennsylvania Power and Light Co. at 13,200 volts, which is reduced to 440 volts by two banks of transformers. Distribution is through General Electric Co. truck type panels, and each department is metered.

C. F. Conn is president of the Giant Portland Cement Co. and O. D. Havard is general superintendent. Under Mr. Havard's direction the entire reconstruction was designed and supervised by the writer.

Fifteen More Potash Wells in Texas

THE Department of the Interior, in its search for potash deposits in Texas and New Mexico, through the Geological Survey, announces the discovery of potash in 15 additional wells, distributed in 7 counties in the western Texas region and in 1 county in New Mexico. Reagan, Pecos, and Upton counties each contain 3 of the wells, Crane County 2, and Loving, Midland, and Ward counties, in Texas, and Eddy county, in New Mexico, 1 each. There are now 48 wells in 17 counties of Texas and 2 wells in 1 county in New Mexico, or a total of 50 wells in 18 counties in the two states named that have furnished potash data available at the Geological Survey.

The laboratory examinations of the cuttings from these 15 new wells included qualitative tests of 710 samples and quantitative determinations of 217 samples. Of the last mentioned samples 117 yielded more than 1.5% of potash (K_2O), and 11 yielded more than 5%. The percentages of potash given below are those in the samples as received at the laboratory of the Survey. Percentages of potash in the soluble salts are usually somewhat higher.

Qualitative data, accumulating at an increasing rate, point to wider distribution of potash (polyhalite) both horizontally and vertically in the western Texas and New Mexico region and increase the probability of the eventual discovery of commercially important potash beds. The demonstration of the existence of such beds must, however, be made with quantitative data obtainable only by core drilling. When cores of the salt beds are available the geologist and the chemist will be able to see and test the strata foot by foot and to determine just how thick and how rich any potash beds at any given locality may be.

Talc and Soapstones in 1924

THE Bureau of Mines, Department of Commerce, has just issued the survey on talc and soapstone production and shipment for 1924. Both the total quantity and value of these materials show an increase. The quantity sold in 1924, 203,821 tons, was about 4% over 1923, the largest ever, excepting in 1920. The value showed an increase of 17% over the previous year.

Three new operators entered the industry, one at North Carolina, the National Soapstone Co., and two at Virginia, the Charlotteville Soapstone Co. at Esmont and the Phoenix Stone Co. at Arrington. Two producers in Maryland resumed operations and one in California closed down.

Advertising to Create Demand for Better Materials

IT is often stated that the way to secure the more general use of the best building materials is by a campaign of education. This has been advocated persistently by our national associations, and they are doing this very thing in a broad way by placing before engineers, architects and others in charge of work the latest findings of investigators relative to quality of materials.

It is manifestly impossible for the national bodies to go into any widespread advertising campaign to educate the general public. This would be an undertaking entirely outside their province and the financial burden would be more than they could carry.

The work of this direct advertising to educate the public to the value of good materials carefully prepared has therefore fallen upon state and local associations and individual producers. This so distributes the cost as to make it not burdensome, while the message can thus be fitted to local conditions and can more immediately benefit those who are paying for it.

The work done in this direction by the Wisconsin Mineral Aggregate Association has often been commented on, and has helped greatly in reducing the use of aggregates not carefully prepared.

The Illinois Sand and Gravel Association carried on a successful campaign last year, running an advertisement once each week for 15 weeks in 25 of the leading papers of the state outside of Chicago. The expenditure for this advertising seemed to produce such valuable results that a similar campaign is being financed this year, using 12 pieces of copy, covering a period of 12 weeks, but considerably enlarging the list of papers.

The present advertising still carries the little panel which made its impression upon the Illinois public last year and which still persuasively advises the newspaper readers of the state to "Insist Upon Washed and Graded Sand and Gravel."

In preparing its advertising the association has endeavored to present in easily comprehended form the most advanced developments relating to the quality of sand and gravel. "All authorities are agreed," says one of these advertisements, that you cannot build safely or permanently unless you use washed and graded sand and gravel for concrete construction of any kind." The deleterious effect of tannic acid is also shown in one or two of the advertisements, and well-known authorities are quoted throughout the series to give weight to the statements made.

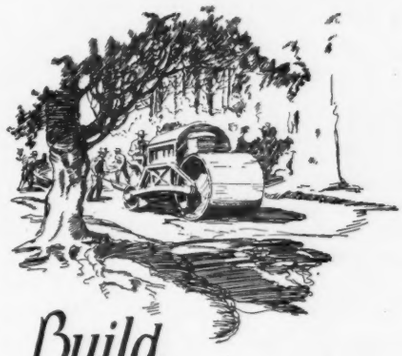
Illustrations are used in about half of the advertisements, serving to arrest the attention and help to carry home the message.

Another association which is advertising as a body for the benefit of its members is the Florida Lime Rock Association. It is using as its slogan, "Lime Rock Is the Life of the Highway," both this and the text of its advertisements indicating its purpose to specialize on highway work.

The binding qualities of the rock produced by these operators makes it especially useful for much of the road work being done in Florida. Under the heading, 'The Base Is the Life of the Highway," one of the advertisements says:

Right depth of Lime Rock, graded for proper drainage, makes a marvelous base. Some of the foremost testing laboratories for road materials give Lime Rock their best credentials, and the Federal Bureau of Highways approves it for use on roads which the Government builds. These facts alone are influencing officials and communities throughout Florida to specify Lime Rock.

Loaded trucks and hurrying passenger cars constantly challenge the best of surfaces, but experience has shown unusual strength and durability in Lime Rock, for there is a compactness about this material developed in its use. Lime Rock is spread as a watered mixture. Its chemical characteristics are such that a part dissolves and under the roller the mass becomes a solid, smooth, resilient foundation which cushions the shocks of traffic and stoutly resists the wear and tear of speed as transmitted through the surface.



Build
Permanent Roads for Present-Day Traffic

POUNDING trucks, rushing busses, speeding automobiles—disastrous to highways, a constant problem to the road builder and an unending cost to the taxpayer How necessary that, *when built* a road represent the three fundamentals of road-permanence Sturdy durable base proper surfacing and scientific drainage. And the lack of any one spells early ruin to the best of roads but as foundation is important in any construction project. *base is the life of a highway!*

Lime Rock Solves the Problem

History of roads with a Lime Rock base, the most severe of scientific tests, and the rigid requirements of the Government itself all testify to the worthiness of Lime Rock.

Lime Rock has the endorsement of leading testing laboratories as a material of exceptional permanence when drainage is right and surfacing properly spread

Lime Rock has the approval of the Federal Bureau of Highways, as base material for Government roads

Such is the chemical composition of Lime Rock it is its own binder and substance under pressure an economy of special importance in building long-lasting roads rapidly

Road life largely depends on its base—and the choice of a base should depend on facts!

Lime Rock Is the Life of the Highway

A FLORIDA PRODUCT

FLORIDA LIME ROCK ASSOCIATION

P O Box 1202 JACKSONVILLE FLORIDA

All authorities are agreed that you cannot build safely or permanently unless you use washed and graded sand or gravel for concrete construction of any kind.

There is a reliable dealer in your town who can supply you with Washed and Graded Sand or Gravel. See him.

Insist upon Washed and Graded Sand and Gravel

Illinois Sand and Gravel Association
Producers of Washed and Graded Sand and Gravel

You can't afford to use dirty sand or gravel---

If you would build safely, more economically, and permanently, use washed and graded sand and gravel. It makes better concrete.

A report of the U. S. Geological Survey declares: "It has been found by experiment that to use run-of-bank (Unprepared) material for structural concrete work is a haphazard and careless method."

There is a dealer in your town who can supply you with WASHED and GRADED sand and gravel.

Insist upon Washed and Graded Sand and Gravel

Illinois Sand and Gravel Association
Producers of Washed and Graded Sand and Gravel

You can't make good mortar, good concrete, or good plaster with ordinary bank run sand or gravel because it contains organic matter which forms tannic acid and eventually destroys it.

There's a reliable dealer in your town who can supply you with Washed and Graded Sand and Gravel.

Insist upon Washed and Graded Sand and Gravel

Illinois Sand and Gravel Association
Producers of Washed and Graded Sand and Gravel

Dirty, ungraded sand or gravel is absolutely unfit for any form of concrete construction. Protect yourself against cracking and crumbling concrete, mortar or plaster by telling your dealer you want only washed and graded sand and gravel. There's a reliable dealer in your town who sells it.

Insist upon Washed and Graded Sand and Gravel

Illinois Sand and Gravel Association
Producers of Washed and Graded Sand and Gravel

This is the class of advertising being done by some of the associations

The Design of Stone Crushing Plants

Part II.—A Simple Plant, with One Crusher, Elevator and Screen

By Hugo W. Weimer
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PREVIOUS articles as submitted by the writer in various editions of ROCK PRODUCTS since January 23 have covered the principal equipment required for the ordinary crushing plant of medium size. Crushers of all types, as well as various designs of screening equipment, have been illustrated and described in such a manner that sufficient information can be obtained from these articles to make a preliminary schedule of the necessary equipment for a plant of a given capacity. It naturally will be of interest to many readers to be shown the manner in which this data can be applied to a prospective plant.

Let us assume that it is desired to lay out a small stone crushing plant to produce various sizes of fairly hard limestone. The maximum capacity is to be not over 50 tons per hour, and to produce material from ¼ in. to 2½ in. ring size. By referring to the gyratory crusher table in the January 23 issue of ROCK PRODUCTS we find that a No. 6 or 12 in. gyratory crusher is listed as having a capacity of 50 tons per hour to 2½ in. ring size, and therefore since the maximum capacity is 50 tons we can select this crusher as the size required.

We will further assume that it is desired to make four sizes of product besides the dust and these sizes will be: 2 in. to 2½ in., 1¼ in. to 2 in., ¾ in. to 1¼ in. and ¼ in. to ¾ in. In the May 29 issue we find that this crusher to produce 85% of the product to 2½ in. ring size should be set to have an opening of 2 in. on the open side.

The next problem to solve will be to determine what percentage or tonnage of each of the sizes of product mentioned will be produced by this crusher when fed with the ordinary run of material such as would be produced in the quarry suitable for a crusher having a 12 in. opening.

The product diagram published in the May 29 issue is to be used for determining this feature. This diagram is fully explained; and Table 2, in the same issue, which is an example to show the working of the diagram, covers the sizes as wanted in our proposed plant. Therefore by referring to that issue the reader will note that the percentages of the various sizes vary from 7% to 26% of the total tonnage of 50 tons per hour.

We will assume that an elevator is required to carry the material from the crusher to a rotary screen placed above storage bins. This elevator is to be of the inclined belt type with continuous steel buckets, and by referring to the May 29 issue, Table 4, we find that an 11 in. bucket is listed as having a capacity of 53 tons per hour. We will, however, choose the next size or 13 in. bucket, because it is never advisable to figure too close when installing an elevator on account of the sudden surges that occasionally occur.

The screen to be used is of the rotary type; and in Table 1 of the May 1 issue we find that a 40 in. screen is listed as having an average capacity of 55 tons per hour. This is very close to our maximum capacity and as it has been proven in actual practice that it is seldom advisable to install a rotary screen of less than 48 in. dia., we will decide to use the larger size. This screen will be required to make four finished sizes of product besides the dust, returning the oversize to the crusher.

It is now necessary that we determine the length of the various sections. We know that we will require four sections in the main drum having different sizes of openings and also an outer jacket to remove the dust. We have listed in Table 2 of the May 29 issue the percentages and tonnages of the various sizes and in the May 1 issue, Table 2, we have a table giving us the capacity of various sections per foot in length, and by using this information we proceed as follows: 15% or 7½ tons per hour is over 2½ in. ring size and must be returned to the crusher for further breaking. The first section in the main drum will have all material minus ¾ in. passing through its perforations and this will be 11½ tons as shown in the list of sizes produced; and by referring to the screen table we find listed under the heading of 48 in. screen dia., with maximum ring size of feed as 3 in. (which is practically the maximum size in our example), that each foot of length will produce 2½ tons per hour of ¾ in. and less ring size material; thus dividing the required tonnage of 11½ by 2½ tons per foot we find that this section should be 4.6 ft. in length. The other sizes are worked out in a similar manner and the result of each would be as shown in Table I of this article.

In the May 1 issue of capacities for rotary screens the writer did not list capacities for the outer jackets, although the method for determining the capacities was given. In order to give this information in a simple form Table II of this article should be used for estimating the capacity of the dust or outer jacket. In Table I we have arrived at a theoretical length of each section that is required, but naturally it is always well to make the lengths of some standard practical size. The writer has therefore listed

TABLE I.—TO DETERMINE LENGTH OF EACH SECTION IN 48-INCH SCREEN

Maximum ring size feed (inches)	Size of product (inches)	Total tonnage required	Listed capacity per footof length (tons)	Theoretical length of sections required (feet)	Practical length of each section (feet)
¾	¼	3½	1.5	2.4	5
2⅞	¾	11½	2.5	4.6	6
2⅞	1¼	9	3.7	2.5	4
2⅞	2	13	5.0	2.6	3
2⅞	2½	9	5.7	1.6	3

TABLE II.—CAPACITY TABLE FOR OUTER JACKETS OF ROTARY SCREENS

Screen diameter (main drum) (inches)	Maximum ring size of feed (inches)	Ring size of product—tons per hour per foot of length: ¼ in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1¼ in.
	½	.8	.9	1.1	....	....	....	....	....
	¾	.6	.8	.9	1.0	1.1	....	....	....
24	1	.5	.7	.8	.9	.9	1.0	1.1	....
	1¼	.4	.5	.7	.8	.8	.9	1.0	1.1
	½	1.3	1.5	1.8	....	....	....	....	....
	¾	1.0	1.3	1.5	1.6	1.8	....	....	....
32	1	.8	1.1	1.3	1.4	1.5	1.6	1.8	....
	1¼	.6	.8	1.1	1.3	1.4	1.5	1.6	1.8
	½	1.7	2.2	2.6	....	....	....	....	....
	¾	1.2	1.7	2.1	2.3	2.6	....	....	....
40	1	1.0	1.4	1.7	2.0	2.2	2.4	2.6	....
	1¼	.8	1.2	1.5	1.7	1.9	2.2	2.3	2.6
	1½	.7	1.0	1.2	1.5	1.7	1.9	2.1	2.3
	½	2.1	2.7	3.1	....	....	....	....	....
	¾	1.5	2.1	2.5	2.8	3.1	....	....	....
48	1	1.2	1.7	2.1	2.4	2.7	2.9	3.1	....
	1¼	1.0	1.5	1.8	2.1	2.3	2.6	2.8	3.1
	1½	.9	1.2	1.5	1.8	2.1	2.3	2.5	2.8
	½	2.6	3.4	3.9	....	....	....	....	....
	¾	1.9	2.6	3.1	3.5	3.9	....	....	....
60	1	1.5	2.1	2.6	3.0	3.3	3.6	3.9	....
	1¼	1.2	1.9	2.2	2.6	2.9	3.3	3.5	3.9
	1½	1.1	1.5	1.9	2.2	2.6	2.9	3.1	3.5
	½	3.1	4.1	4.7	....	....	....	....	....
	¾	2.3	3.1	3.7	4.2	4.7	....	....	....
72	1	1.8	2.5	3.1	3.6	4.0	4.3	4.7	....
	1¼	1.4	2.3	2.6	3.1	3.5	4.0	4.2	4.7
	1½	1.3	1.8	2.3	2.6	3.1	3.5	3.7	4.2

the length of each section as it should be figured, which, as will be noted, requires a screen of 48 in. dia. with a total length of the main drum of 16 ft. and also having an outer jacket 5 ft. long.

It is always well to have the first sections and also the outer jacket of ample length so that any surges of fine material that occasionally occur, or extraordinary dampness of the material, will not affect the efficient screening. Another reason for being liberal in making the actual allowance of the length of sections is to take care of the circulating load, which is the oversize material returned to the crusher and is not taken into consideration in the table giving the percentages and tonnages of the various sizes of product.

Determining the Sizes of Screen Perforations

Knowing the ring sizes of product, we can by referring to Table 1, May 29 issue, determine the sizes of screen perforation necessary for each section. The screen perforation is required to be about 25% larger in diameter than the ring size of product. Thus for ¼ in., ¾ in., 1¼ in., 2 in. and 2½ in. ring sizes we should have 5/16 in., ⅞ in., 1½ in., 2½ in. and 3 in. perforations respectively. All of the screen sections in the main drum should be made of perforated steel plate with a thickness of ¼ in., and with reference to the dust jacket the writer would recommend that double-crimped steel wire cloth be used. While the life of the wire cloth may not equal the perforated plate, the efficiency is much greater and therefore the additional cost of operating is more than offset by the screening performance.

The flow sheet as shown is very helpful in illustrating our problem. Assuming that an elevator of 50-ft. centers would be required, the list of principal equipment and power required would be as follows, based on information given in the preceding articles:

One 12 in. gyratory crusher; 50 hp.

One 13 in. bucket elevator, 50-ft. centers; 5 hp.

One 48 in. by 16 ft. rotary screen with 5-ft. outer jacket; 13 hp.

Assuming that electric power is available, two motors will be required for driving this equipment. One 50 hp. motor can be belted direct to the crusher, and one 20 hp. motor can be belted to the elevator drive shaft, from which shaft the screen will also be driven. This makes a very simple arrangement, and as the gyratory crusher pulleys and also the elevator countershafts are run at a speed which will allow of belting direct to a fairly high speed motor, the crusher motor can be run at about 1200 r.p.m. and the elevator and screen motor at 600 to 900 r.p.m.

In addition to the equipment listed there will be required other accessories such as belting, bin gates, trolleys and hoists for handling the crusher parts, and preferable also similar equipment for handling the screen parts and possibly a friction type hoist for pulling the cars from the quarry level to the crusher. By referring to the May 29 issue, Table 3, we find that for a 13 in. crusher, which is about the size we require, a 4-ton hoist will handle the weight of the spider or the shaft with head, which are the heaviest pieces to be lifted for any ordinary repairs.

Now Ready for Quotations

We are now in position to list practically all of the equipment required for the crushing plant proper and obtain quotations, which, together with an estimate of the cost of the bins and building to suit the local conditions, will give a very close estimate of the entire cost of the crusher plant proper. The same method used in figuring this simple stone crushing plant can be applied to larger and more complicated plants which may have a primary crusher with a scalping screen and secondary crusher with possibly two finishing screens.

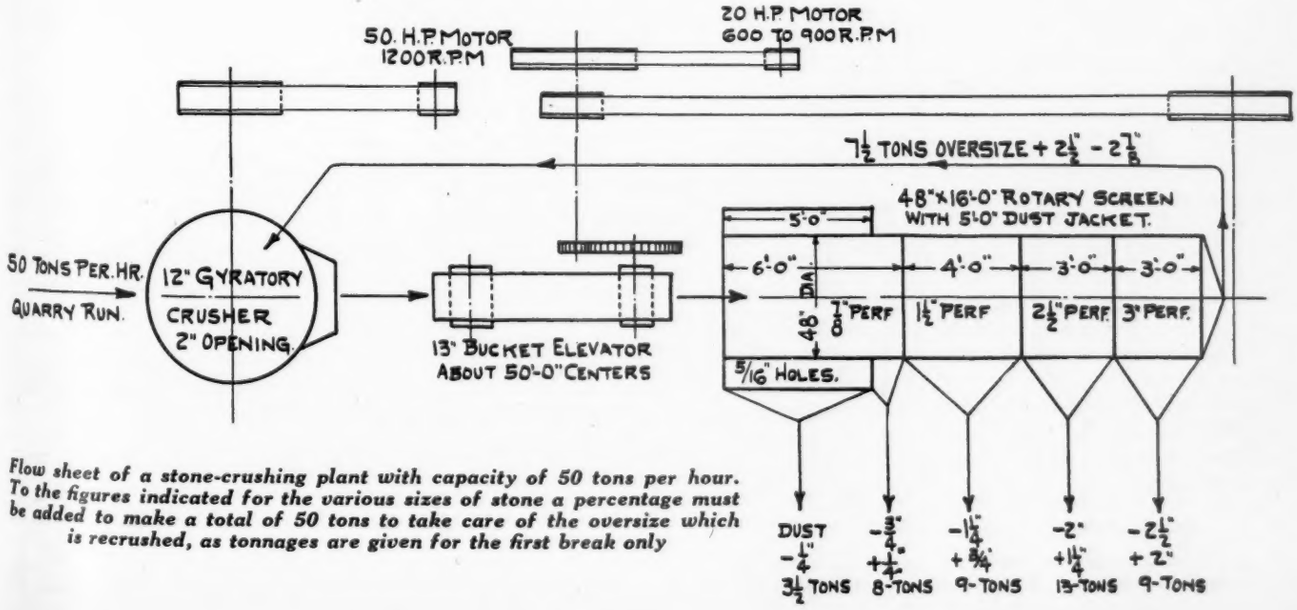
While the writer's method of calculating a crusher plant may seem too theoretical, it is well to bear in mind that most of the data used were obtained from actual experience and certainly it is a fact that we find even some of the existing plants would be greatly benefited if by a similar method their equipment were thoroughly checked. Each plant is of course limited to a certain capacity, but very often the unit that is the boottle neck can be slightly altered, and thus increase the capacity of the entire plant.

Coogan Gravel Company to Operate Near Chillicothe, Illinois

THE Coogan Gravel Co., Peoria, Ill., has leased 77 acres near Chillicothe, Ill., from the Rock Island railroad. The deposit had been purchased for ballast land by the railroad after extensive tests. J. M. Coogan has written us to correct any erroneous idea that the deposit was abandoned by the railroad because of excess clay. He says:

"The Rock Island railroad operated in this deposit for five or six years using a steam shovel and clamshell, loading directly into the cars without any preparation whatever. There has never been any sand and gravel washing or screening plant located in this deposit before and there is no evidence of any excessive amount of clay or foreign matter."

The plant will be equipped with a 100-hp. Thomas hoist, Fairbanks-Morse pump, Telsmith screens and a 1½-yd. Pioneer bucket. The company's office will be located at 1020 Peoria Life building, Peoria, Ill. Porter Clark of Bloomington, Ill., for many years engaged in the contracting business, is to be plant superintendent.



Flow sheet of a stone-crushing plant with capacity of 50 tons per hour. To the figures indicated for the various sizes of stone a percentage must be added to make a total of 50 tons to take care of the oversize which is recrushed, as tonnages are given for the first break only

High-Alumina Hydraulic Cements[1,2]

Discovered by Americans but Developed as a Commercial Product by European Manufacturers

By P. H. Bates
Bureau of Standards, Washington, D. C.

A GREAT deal of interest has been aroused recently by the appearance on the market of a new hydraulic cement characterized by the rapidity with which it attains strength. While portland cement will develop at the end of 28 days a strength of 2200 pounds per square inch when tested in a concrete of fair quality, composed of one part of cement to six parts of aggregate of good selection and grading, a concrete of this new cement will develop the same or greater strength at 24 hours when made of the same materials.

It is natural that there should be some interest as to wherein this cement differs from portland cement. This, so far as composition is concerned, can be answered by referring to the following table:

Portland Cement	Per cent	*High-Alumina Cement*	Per cent
SiO_2	22.0	SiO_2	5.0
Al_2O_3	6.5	Al_2O_3	42.0
Fe_2O_3	3.0	Fe_2O_3	10.0
CaO	63.0	CaO	42.0
MgO	3.0	Impurities	1.0
SO_3	1.5		
Impurities	1.0		

These new cements are, therefore, distinctly high in alumina and consequently are frequently called high-alumina cements. Portland cements are made from either limestone and clay or any other naturally or artificially occurring materials such as will give the composition required after mixing and burning, while, on the other hand, to make the new product limestone and bauxite are needed.

The process of manufacture of both cements is identical with two slight exceptions. The raw materials are finely ground together after careful blending to secure the needed composition, then calcined to a clinker to bring about the needed reaction between the basic and acidic oxides of the raw materials, and the resulting mass is ground to the fineness shown by the finished cement as it reaches the market. The first distinct but slight difference is that whereas in this country portland cement is always clinkered in a rotary kiln—and even when otherwise burned, as it is frequently abroad in kilns resembling a lime kiln, it is again burned to a clinker—the new cements, though they may be burned in a rotary kiln, are fused to a liquid or semipasty mass. Abroad they are produced either in a cupola from mixtures of fuel, limestone, and bauxite and the resulting cement tapped off as a slag, or they are produced in an electric arc furnace and again the product is obtained as a fused mass. Hence we have the origin of another name used especially abroad—*ciment fondu,* fused cement. The second difference is that before grinding the clinker of portland cement it is necessary to mix it with 3 per cent of gypsum to retard and regulate its tendency to very quick setting (but not hardening) which characterizes these cements, whereas the high-alumina cements are slow setting (but quick hardening) and consequently do not require the addition of any foreign materials before grinding.

Note—It is necessary to distinguish between setting and hardening. The former is the stiffening of the mass of cement, aggregate and water so that it can no longer be readily molded, while the latter more properly comprises the rate of acquiring strength.

Early Developments

Although the high-alumina cements have aroused new commercial interest, they are not new. In 1883[3] Roth took out a patent covering the use of bauxite in the manufacture of a cement. In this patent he limits the alumina content to "from 6 to 10 per cent or more." Apparently he covered the high-alumina cement from this one clause. However, he unfortunately also places limits upon the lime and silica content, the minimum limits in both of these cases being such that the maximum alumina content would not permit of making a true high-alumina cement.

Later patents were taken out by Spackman and Lazell,[4] which cover the making of true high-alumina cement. At the time Spackman and Lazell were doing their work, Bied,[5] at that time technical director of the Lafarge Cement Co. (Societe Anomye Chaux et Ciments des Lafarge et du Teil) of France, took out patents in France. The commercial development to any extent did not follow immediately. Spackman, whose original purpose seems to have been the making of an accelerator for lime and natural cement, placed on the market an aluminous accelerator under the name of "Alca," some of the properties of which he described before the American Society for Testing Materials.[6] During 1916 the Bureau of Standards produced a number of high-alumina cements in its experimental cement plant, and as a result of this work suggested their use for the placing of large guns when this country entered the late war. At the end of the war it was announced that the French had actually produced and used these cements for this purpose during the war, but independently of any suggestions from this side. At the 1919 meeting of the American Society for Testing Materials a paper[7] was presented by a member of the Bureau of Standard's staff giving the first results which had been obtained in its laboratories in the making and testing of these quick-hardening cements. At the same time this paper was being presented before the American Society for Testing Materials, Endell read a paper before the German Cement Manufacturers,[8] giving data obtained from some cements which he had made of a composition very similar to those made at the Bureau of Standards. At this time also Bied formed a corporation in France for the commercial production of fused cements and at about the same time the Lafarge company started commercial production. These represented the first commercial production of high-alumina cement anywhere. In 1921 appeared a paper by the Bureau of Standards[9] which gives in considerable detail general information covering the making and the properties of this material. In December, 1922, Bied read a paper[10] relating his early research work, but not giving any particular detailed data except that which he quoted from the Bureau of Standards paper.[9]

Whereas Spackman was apparently seeking a quick-hardening product, Bied states that he was seeking one that would be immune to the attack of sulphate solutions such as sea water or the gypsum-bearing waters so common to many parts of France. These waters are particularly de-

[1] From *Industrial and Engineering Chemistry,* Vol. 18, No. 6.

[2] Published by permission of the Director, National Bureau of Standards.

[3] U. S. Patent 270,608 (1883).

[4] U. S. Patents 903,018 (1908); 1,029,953 (1912).

[5] Bied mentioned these cements incidentally in a paper on "Various Chemical Phenomena Encountered in the Course of Industrial Investigations," *Proc. Intern. Soc. Testing Materials,* 2nd Section, XVIII-1 (1912).

[6] *Proc. Am. Soc. Testing Materials,* **10,** 315 (1910).

[7] Bates, *Ibid.,* **19,** 425 (1919).

[8] Endell, "Uber Tonerdereiche Zements," Protokall Vereins Deutscher Portland Zement Fabrikanten, June, 1919.

[9] *Bur. Standards, Tech. Paper* **197** (1921).

[10] "Les Ciments a Haute Teneur en Alumine," Soc. d'Encouragement des Sciences, January, 1923.

structive to portland cement products unless great care is taken in their manufacture. He states that he consequently bore in mind Vicat's research published in 1818, according to which *un ciment indecomposable* would be obtained if the ratio $\frac{SiO_2 + Al_2O_3}{CaO + MgO}$ was greater than 1. This ratio in portland cement is about 0.5. Furthermore, he knew he could not increase the silica content to obtain this ratio, because in so doing he would bring the composition into the field of metallurgical slags, which have little or no setting properties. He consequently increased the alumina content and obtained these new cements.

Nature of the New Cements

Investigative work[10] has shown that normal portland cement is composed of a heterogeneous mixture of $3CaO \cdot SiO_2$, $2CaO \cdot SiO_2$, $3CaO \cdot Al_2O_3$, and unidentified compounds, largely glass, of iron and the other oxides which it may contain. In the Bureau of Standards paper[9] it is shown that the high-alumina cements are composed of $CaO \cdot Al_2O_3$, $3CaO \cdot 5Al_2O_3$, $2CaO \cdot SiO$, $2CaO \cdot Al_2O_3 \cdot SiO_2$, and certain other unidentified compounds of iron, magnesia, and the other impurities. If the lime content is somewhat high, there may be present $5CaO \cdot 3Al_2O_3$ in place of the $3CaO \cdot 5Al_2O_3$. In portland cement the constituent active in the setting is the tricalcium aluminate, which in a pure condition hydrates in water as energetically as quicklime, with no hydrolysis and with no formation of compounds having any marked bonding properties. The constituent producing the early hardening is the tricalcium silicate, which breaks up into a hydrated lime and an amorphous silicate of a lower lime content. The dicalcium silicate reacts very slowly with water and has but little bonding properties at early periods. It also liberates a very small quantity of lime and an amorphous silicate somewhat higher in lime than the monocalcium silicate. The aluminates present in the new cement are decomposed by water into hydrated alumina and hydrated tricalcium aluminate. This is a slow reaction compared with that of the tricalcium aluminate and water, but it seems to proceed in the course of a few hours to a far greater completion than does the reaction of the silicates of portland cement. But the different speed and type of reaction with water of the two cements is evidenced by the fact that unless a retarder—preferably and almost invariably gypsum—is added to portland cement it reacts so energetically immediately that it cannot be used commercially, whereas no retarder whatsoever is added to the alumina cement. This retarder is added solely to control the rate of setting or initial stiffening of the mass and not the hardening or strength-gaining properties of the cement. Unretarded portland cement of the composition used at present in commerce, while setting rapidly, never acquires sufficient strength to be of any practical use.

The separating of lime in the hardening of portland cement and of alumina in the hardening of alumina cement, the slow hardening of the former and the quick hardening of the latter, have suggested to some the possibility of mixing the two, thus inducing the desired quick hardening of the portland cements through a combination of the soluble lime liberated in its reaction with water with the alumina set free in the hardening of the alumina cements. Unfortunately, this possibility is not realizable commercially. When enough alumina cement is used to produce any great amount of quick hardening of the portland cement, a very quick set is obtained and with it the relatively low strengths which characterize quick-setting cements. No retarder has been isolated which will delay the set of such mixtures to the extent of permitting the development of satisfactory strengths.

Figures 1 and 2, taken from Rankin's paper,[11] are presented in order that the reader may realize the relation between the constitution of portland cements and high-alumina cements. The areas in the lime-alumina-silica system occupied by these two cements are indicated by the shaded areas. Work at the Bureau of Standards has shown that one can immediately determine what compounds would be present in cement by locating the composition as determined from the analyses on such a diagram as Fig. 1, which shows the fields of stability of this system. Of course, as the amount of oxides other than lime, alumina, or silica becomes larger, the possibility of error increases, but it is generally very surprising to note how a petrographic examination of cement clinker will corroborate such a procedure. It can be noted that, as the petrographic examination has shown, the dicalcium silicate is generally common to both of these cements, but in portland cement it is seldom present to the extent of less than 40%, whereas in alumina cement it is present to but a very light extent. All the other constituents of the two cements are different.

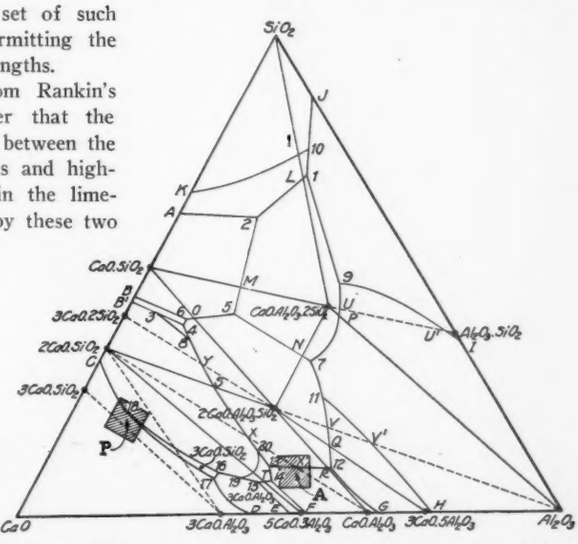


Fig. 1—Diagram of the Ternary System CaO-SiO_2-Al_2O_3, showing the field of portland cement, P, and the alumina cement, A (after Rankin)

Figure 2 indicates to those familiar with the meaning of such models why the alumina cements are preferably fused and not clinkered as is portland cement. In this figure the vertical distances indicate relative temperatures, and hence it is immediately noted that portland cement is present in a region in which the compounds are formed at a high temperature where slight changes in composition require relatively marked changes in temperature to bring about the needed reaction, whereas the alumina cements occur in another region where the temperature at which the compound is formed is considerably lower and also where slight changes in composition will require marked changes in the temperature needed to bring about the desired reaction. Portland cement has what is known to ceramists as a wide firing range. Alumina cements have a very narrow firing range. Hence it is possible to clinker portland cement readily, but in the case of the alumina cements there is a very narrow range of temperatures at which they are a clinker and outside of which they are either a mass of uncombined raw material or a liquid. This fact, coupled with the fact that the temperature at which the fusion takes place is lower than the temperature at which clinkering takes place in portland cement, is the reason for producing the alumina cements by fusion. It is not so generally understood on account of the high temperature required for the combination. The following data from Rankin[11] give the melting points of the compounds and eutectics which may occur in the fields of the two cements:

PORTLAND CEMENT

		Deg. C.
$2CaO \cdot SiO_2$		2130
$2CaO \cdot SiO_2$ } $3CaO \cdot SiO_2$	Eutectic	2065
$3CaO \cdot SiO_2$	Dissociate	1900
$3CaO \cdot Al_2O_3$	Dissociate	1535

ALUMINA CEMENT

$2CaO \cdot SiO_2$		2130
$2CaO \cdot Al_2O_3 \cdot SiO_2$		1590
$CaO \cdot Al_2O_3$		1600
$3CaO \cdot 5Al_2O_3$		1720
$5CaO \cdot 3Al_2O_3$		1455
$CaO \cdot Al_2O_3$ } $3CaO \cdot 5Al_2O_3$ {	Eutectic	1590
$CaO \cdot Al_2O_3$ } $5CaO \cdot 3Al_2O_3$ {	Eutectic	1400
$CaO \cdot Al_2O_3$ } $2CaO \cdot Al_2O_3 \cdot SiO_2$ } $2CaO \cdot SiO_2$	Eutectic	1505
$CaO \cdot Al_2O_3$ } $5CaO \cdot Al_2O_3$ } $2CaO \cdot SiO_2$	Eutectic	1355

It should be remembered that the impurities such as iron and magnesia bring about the formation of low-melting compounds, which assist in the formation of the above compounds at lower temperatures. Work at the Bureau of Standards has shown that the average clinkering temperature of portland cement is about 1435 deg. C., whereas the

[11] Rankin, *Am. J. Sci.*, **39**, 1 (1915).

alumina cements such as produced commercially fuse at 1425 deg. C.

Physical Properties

The data in Table I give some of the physical and chemical characteristics of four of each of these cements. Alumina cement *A* is a commercial cement of this type. The other three alumina cements were produced in the Bureau of Standards experimental cement plant. One of these is very close to the commercial cement in lime and alumina content, but higher in the silica and lower in the iron oxide content. However, in this respect the Bureau of Standards product approaches very closely the composition of the fused cements made in France, which, incidentally, is the only country abroad where they have been produced over an extended period. Cements *B* and *D* are of higher alumina content than that now used commercially. *D* is of interest in that it approaches as closely to the composition $3CaO{\cdot}5Al_2O_3$ as possible without the use of chemically pure raw materials. However, a petrographic examination showed it to contain considerable amounts of $CaO.Al_2O_3$ and a very small amount of $2CaO{\cdot}Al_2O_3{\cdot}SiO_2$. This particular cement can hardly be considered a commercial possibility.

Super-Portland Cement

The portland cements given in the table are commercial domestic cements, except *F*, which is an imported "super-portland cement." With the marketing of the alumina cements in France, those countries not favored with their own source of bauxite were at a material disadvantage in their lack of a domestic source of quick-hardening cements. As a result, Germany in particular began to study the possibility of improving the quick-hardening properties of portland cement. Consequently, there have appeared throughout Europe certain quick-hardening portland cements, very frequently referred to as super-cements, which do develop a higher strength at earlier periods, than the usual material of this type. However, there is no particular new development in their production. The raw materials are more carefully blended, the lime increased to the maximum; they are more finely ground, and the burning is conducted more carefully and at a higher temperature, as is required by the higher lime-silica ratio. The resulting clinker is also ground much finer, generally 90% to 95% through a 200 sieve instead of the usual 78%. This practice of fine grinding of the clinker also holds in the alumina cement industry, although the cements of this type prepared at the Bureau of Standards have not been ground any more finely than that required by the United States standard for portland cement. It can be appreciated that the finer cement is ground, the more surface is exposed to water, and consequently the more readily is the reaction of hardening carried out.

The strengths given are typical of the two types of cement. It will be seen that the tensile strength of the alumina cement is from two to four times that of portland cement at 24 hours, but that the gain in strength with age is minor, whereas with portland cements the gain is very considerable. The compressive strengths of the alumuina cement as a mortar are from four to eight times that of the portland cement—neglecting the super-portland cement—at the early periods; but, again, they do not maintain this advantage with age. Again neglecting the super-portland cement, at 24 hours the portland cements had so little apparent strength as a concrete that the specimens were not tested, but the super-cements had only one-tenth the strength of the alumina cements; but, again, the latter do not maintain this advantage with age. It is distinctly seen, however, that the new cements do have the high early strengths accredited to them.

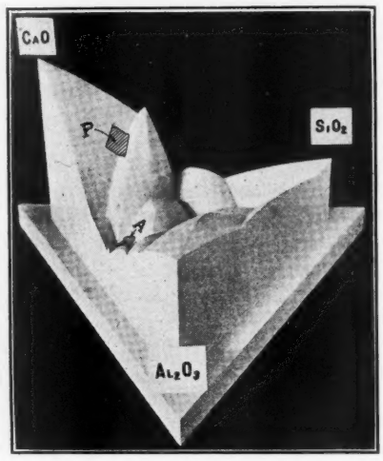


Fig. 2—Photograph of solid model of concentration-temperature diagram of Ternary System CaO-SiO_2-Al_2O_3 (after Rankin)

Another distinctive feature is that the relative compressive strength, especially as a concrete, of the two cements is much greater than is the tensile strength as a mortar. This is important in view of the very pronounced custom of evaluating the compressive strength of a cement as a concrete from its tensile strength as a mortar. If this procedure is followed in the case of the alumina cement, using the ratio holding in the case of portland cement between the two types of test pieces, there is obtained an entirely too low approximation of the concreting value. Putting these facts in another way, the portland cement has a relatively high tensile strength and a relatively low compressive strength, and the alumina cement the reverse. In this connection also note the high tensile strength of the imported super-cement, which compares very favorably with the alumina cement, but note again its low compressive concrete strength at 24 and 72 hours. The mistake should not, therefore, be made of trying to predict the early concreting properties of a portland cement from the usual small tensile specimens, making use of the relation which holds for alumina cements between its tensile strength as a mortar and compressive strength as a concrete. The much desired quality of cements of having a high early compressive strength as a concrete suggests studies to see if this property cannot be developed in any manner in the more cheaply made portland cements.

Sulphate Salt Resisting Properties of the Alumina Cements

It has been indicated above that Bied in his original work in developing the quick-hardening cements was following Vicat's suggestion for producing *un ciment indecomposable*—one not subject to attack by the naturally occuring sulphate salt solutions. It is a matter of much concern to portland cement manufacturers and users that products made of it do not resist the disintegrating attack due to the presence of such solutions, to the extent of insuring the desired permanency of life. The cause of this lack of service is not generally understood. It is, however, a well-known fact that even naturally occurring materials such as building stone or such artificially produced commodities as brick and tile are not able to resist the expansive force resulting when such salts as sodium sulphate and magnesium sulphate crystallize from solution in their pores. One can see plenty of evidence of such failure in our country in the white alkali section of the West, which alkali is generally sodium sulphate and less frequently

TABLE I—PHYSICAL AND CHEMICAL CHARACTERISTICS OF HIGH-ALUMINA AND PORTLAND CEMENTS

	High-Alumina Cements				Portland Cements			
	A	B	C	D	E	F	G	H
	Tensile Strength 1:3 Standard Sand Mortars, Lbs. per Sq. In.							
24 hours	372	330	415	330	125	204	122	173
72 hours	425	310	.....	.....	200	320	242	255
7 days	435	330	280	690	255	415	323	327
28 days	425	310	335	540	330	460	383	375
	Compressive Strength 1:3 Standard Sand Mortar, Lbs. per Sq. In.							
24 hours	5615	5345	4410	2860	745	1900	475	400
72 hours	5120	5995	.....	.....	1435	3210	1315	1335
7 days	5085	5640	4880	8610	2140	4195	1635	2205
28 days	4835	6050	5285	7845	3150	5380	2650	3475
	Compressive Strength 1:2:4 Gravel Concrete, Lbs. per Sq. In.							
24 hours	2880	2160	3145	2930	.....	215	.....	.....
72 hours	3330	3245	.....	.....	460	825	.....	.....
7 days	3260	3190	3570	6010	875	1905	1310	1655
28 days	2845	3480	3370	7060	1615	3030	2410	2640
			Chemical Analyses					
SiO_2	3.13	9.58	10.48	0.68	21.92	19.89	22.36	22.16
Al_2O_3	45.00	51.92	46.71	74.11	2.25	6.83	7.27	6.56
Fe_2O_3	10.11	2.45	2.13	0.40	6.88	3.22	2.44	2.46
CaO	41.19	33.82	39.79	23.82	60.92	62.93	64.48	64.89
MgO	0.33	2.57	1.04	0.81	3.40	2.60	1.96	1.98
SO_3	.....	.....	.....	.....	1.60	1.79	1.73	1.64
Ignition loss	0.78	0.04	0.14	0.38	2.30	2.19	0.30	0.43

mixtures of this salt with magnesium sulphate, and still less frequently calcium sulphate alone. In fact, an artificial freezing test (Brard's test) based upon the expansive force of crystallized sodium sulphate, has been in use for years to determine in an accelerated manner the resistance of building stone to normal freezing and thawing. Such a form of disintegration is physical and should the material subjected to such disintegration be free of voids no destructive action can result. But while it is conceded that at least part of the disintegration of concretes is due to the expansion of freezing salts in the voids, it has always been a well-grounded belief that possibly the major fault was due to a reaction of the cement or its products of hardening with the salts in the solution. Hence Bied's efforts along this line.

It is claimed that with portland cement the destructive action is due to the presence of the tricalcium aluminate, which in the presence of soluble sulphate and lime solutions forms a compound $3CaO{\cdot}3CaSO_4{\cdot}Al_2O_3{\cdot}xH_2O$. This is shown in Figure 3, wherein also is shown in the upper right-hand corner a transparent crystal of hydrated lime. In the absence of such sulphates the normal reaction is the formation of hydrated tricalcium aluminate. One of the reasons for the non-acceptance of this theory is the inability to find this calcium sulpho-aluminate in decomposed concrete. This inability is due to the fact, however, that the compound is unstable in solutions not almost saturated with lime, and this latter condition does not obtain except in excellent unattacked concrete. On the other hand, the high-alumina cements hydrate by the formation of the hydrated tricalcium aluminate and hydrated alumina being formed from the hydrolysis of calcium aluminates containing lime and alumina in a greater ratio than 3:1. There is not a sufficient concentration of lime in the presence of these latter cements resulting from the hydration of the minor amounts of silicates to permit the formation of the destructive complex sulfate, and consequently destructive chemical action should not result.

Such an explanation of the different behavior of the two cements under adverse conditions is based partly upon the theory of the formation of the sulpho-aluminates, but more upon its destructive expansive force Such an explanation, however, does not take into consideration the possibility that the harmful sulphate may cause a deviation from the normal process of reaction with water, which results also in the formation of a colloidal hydrated silicate in one case and hydrated alumina in the other. Such a possible departure from the normal course may result in an immediate flocculation of the colloids as they form, which consequently would result in no bonding agent being produced. But according to the theory advanced in the cases under consideration the alumina cements should be far more resistant than the portland cements. However, we have been able to disintegrate alumina cement mortars in sulphate solution in the laboratory of the bureau when these mortars contained sufficient voids. A 1:5 standard Ottawa sand mortar alternately immersed and dried in a solution composed of 0.5% sodium sulphate, 0.5% magnesium sulphate, and 0.5% magnesium chloride began to disintegrate in less than one month. This, however, simply emphasizes the need of such careful grading of aggregates as will produce a dense product. Otherwise, the expansive force of the crystallizing salts contained in the solution will disrupt products made of alumina cement just as they will disrupt portland cement products and such naturally occurring materials as limestones when they contain too great an amount of voids.

Water Control

It is well known that to obtain the optimum strength from portland cement a certain maximum amount of water must not be exceeded. This has been very clearly shown in particular by Abrams,[12] but this optimum is somewhat below that which produces a fluid consistency which lends itself readily to working into forms or around reinforcing. Consequently, more water must be used than is advisable for best strength, but the tendency is to exceed even this conceded necessary excess, with the resulting loss of otherwise available strength.

When the alumina cements first appeared on the market abroad, the foreign manufacturers, in some way misled by the completeness of the process of hydration, suggested that more water be used with it than with portland cement. But this has been found to be even more effective in reducing the otherwise available strength than has excess water with portland cement. In fact, the effect of water is so marked that the too frequently used method with portland cement concrete of obtaining a ready casting mixture by the use of excess water rather than by the choice of properly graded aggregates cannot be used with the alumina cements without a very serious strength reduction. In the design of portland cement concrete it is assumed that the use of any particular aggregate will not so seriously affect the water-cement ratio that a satisfactory concrete will not be obtained, although it may not be so high testing as desired. Such an assumption will not hold, however, with the alumina cement. To obtain the high strengths for which it is purchased, the water-cement ratio which will give the best strength should not be much exceeded in order to obtain a workable mix from a particular aggregate. Should the latter be such that a marked excess of water is needed for a suitable mix, then if good results are desired it will be necessary to choose a different aggregate or grading of aggregates. In some work recently done at the Bureau of Standards[13] with one lot of aggregate in a 1:2:4 mix, each increase of 0.5% of water, in terms of the weight of the dry mix, reduced the strength at 24 hours 11%. With another lot of aggregate in a mix of the same proportions an increase of 1.5% of water reduced the strength 40%. In the latter case the use of 36.5 lb. of water in mixing 500 lb. of dry concrete gave a strength at 24 hours of 4440 lb. per sq. in., while 44 lb. of water with the same dry mix gave a strength of but 2620 lb. per sq. in. Furthermore, not only is the strength reduced but the concrete is of a porous nature and not able to resist a dissolving or disintegrating action of infiltrating solutions.

Heat Developed During Set

Those who are familiar with portland cement know that during the process of setting and early hardening a certain amount of heat is developed. This is generally so slowly evolved that it is dissipated without causing any undue ill effects. On the other hand, the reactions with water resulting in the hardening of alumina cement are so rapid that any marked dissipation, particularly in large masses of concrete, cannot ensue. As a consequence such high temperatures may result that the concrete is permanently injured. This is particularly liable to happen if the custom of covering the concrete with wetted burlap or similar material to prevent evaporation is followed. In fact it has been found advisable in the case of masses of alumina cement concrete of fairly large section to have recourse to spraying

Fig. 3—Broken surface of a portland cement mortar briquet showing the acicular development of $3CaO.3CaSO_4.Al_2O_3xH_2O$ and in the upper right corner a crystal of $Ca(OH)_2$. Mag. 40 ×

[12] "Design of Concrete Mixes," Structural Materials Research Laboratory, Lewis Institute, *Bull.* 1.

[13] *Eng. News-Record*, 95, 462 (1925).

with water at about the time the final set is taking place, which time will vary from 3 to 12 hours after placing the concrete. This time for wetting can be readily determined by noting the first rise of temperature as indicated by the feeling of warmth when placing the hand on the mass.

Reference to the work of Bied and to that of the Bureau of Standards[14] will show that the silicates and aluminates present in either portland cement or alumina cement hydrate but slightly at 105 deg. C. Of these compounds the one which shows the greatest, but far from complete, hydration at this temperature is the monocalcium aluminate. However, as one of the products of its hardening is hydrated tricalcium aluminate and since it is also shown that the latter is only very slightly hydrated at this relatively high temperature, it can be realized what would be the effect in a mass of slightly hardened concrete if a considerable amount of hydration of a compound such as tricalcium aluminate should take place. Undoubtedly, at higher temperatures of hardening the honding is being done through the agency of dissociated hydrated alumina liberated from the partial hydration of the mono or 5:3 aluminate and inclosing considerable amounts of unhydrated or only very partially hydrated tricalcium aluminate. There would result low early strengths and after cooling the mass would be subject to disintegration as the unhydrated compounds came in contact with water with their resultant far more complete hydration.

Uses and Durability of Alumina Cements

The alumina cements have found commercial application based upon either their high strength or their resistance to sulphate-bearing water. Examples of such uses are the underpinning of structures, the paving of streets and roads, the making of foundations for machinery and of structures to be subjected to sea water. It has been found very advantageous in the paving of city streets since they may be opened to traffic immediately after completion. Thus, among many others may be cited several blocks of the Boulevard Haussmann in Paris and Tottenham Court Road in London, which were paved with alumina cements, the surfacing immediately placed thereon and the street immediately open to such traffic as the heavy passenger busses.

In the United States such concrete would be advantageous to use in the last portions to be completed of portland cement concrete roads. Thus, if the last two weeks' work were made of alumina-cement concrete the entire road could be opened to traffic within 24 hours after the completion of the job, by which time those portions constructed of portland cement concrete would have aged sufficiently. It has also been found advantageous in constructing concrete for the intersection of a road being built with one left in service, for by using this cement it would not be necessary to detour traffic at such intersections more than one day.

[14] *Bur. Standards, Tech. Paper* 43.

Alumina cements also have been used in a number of marine structures. The United States Navy has used it in constructing a hydroplane runway at its Norfolk yard and another piece of construction at the Navy Yard at Puget Sound is of interest in having consumed more alumina cement (9000 bbl.) than used in any one job to date. In this particular project, 240 hollow cylinders 60 ft. high and varying from 6 to 16 ft. outside diameter with 6-in. walls were cast and placed in Puget Sound as hollow piles to be filled with portland cement concrete for supporting the deck of a wharf.[15]

The use of the quick-hardening cement made it possible to make the cylinders faster than they could be permanently located. As these cylinders could be handled within 24 hours after making, any extended equipment or space for making any large number before the first could be handled was not required. Indeed, this saving of equipment alone justified the extra expense of using alumina cements, although it had to be transported from the Atlantic to the Pacific Coast. In addition, of course, the securing of a cement more resistant to sea water was sought.

The durability of these cements in service is a matter of some discussion. Of necessity no particularly long-time tests of structures are available. Those reported by the Bureau of Standards[9] extended over a period of three years and the data indicate that when not subjected to water there need be no cause for questioning serviceability. When subjected to the action of water there is a question of durability, but it is possible that a closer adherence to such methods of close mixing water control as later work has found necessary in using this cement would indicate permanency in even this respect. Furthermore, the use of portland cement subject to the washing or infiltration of water is in the majority of cases now only attempted when protected by exterior waterproofing. Such a procedure with the use of alumina-cement concrete would entail no extra cost not encountered in the use of portland cement concrete. Even though service would show that it does not have the predicted and hoped-for immunity from salt attack, there is still an immense field for its use wherever a high early strength is desired. It has also had a marked effect in stimulating interest in the possible improvement of portland cement, having in mind the development of a cement having the characteristics of the high-alumina cement but made from the more readily accessible and widely distributed raw materials.

[15] *Pacific Builder and Engineer*, 32, 12 (1926).

Where to Have Minerals Analyzed

LISTS of chemists, assayers and laboratories equipped to make mineral analyses have just been prepared by the Bureau of Mines in response to numerous inquiries for such information, it has been announced by the Bureau.

Separate lists have been compiled for the eastern, southern, western and middle western states. In each instance the information is given as to the general nature of analyses which the laboratory is prepared to make.

Cement-Lime Mortars Tested by Bureau of Standards

FOR some time there has been a growing inter-relation between portland cement and lime in the mixing of mortars. Lime is added to cement mortars on the ground that it increases the workability and lessens the cost; while cement is added to lime mortars for the purpose of increasing the strength and reducing the time of set. Numerous experiments have been conducted to determine the effect of these admixtures, but they have been scattering and inconclusive, so that the Bureau of Standards considered this a valuable field for investigation and accordingly undertook a comprehensive series of tests. The report of this investigation has just been published by the bureau as Technologic Paper No 308, prepared by H. V. Johnson under the title of "Cement-Lime Mortars."

Tests were made upon cement-lime mortars in which the percentages of cement, lime and sand were varied considerably. It was found that the addition of lime to cement mortars increased the water requirement for the same consistency, very nearly in proportion to the percentage of lime added, that shrinkage is increased by the addition of extra water; therefore, where low shrinkage is of prime importance, lime should be limited in cement mortars.

The report points out that the addition of lime can not be expected to increase the strength of cement mortars richer than 1:2 by weight; with leaner cement mortars the maximum increase in strength which may result from the proper addition of lime is greater the leaner the mortar. The addition of lime in small amounts increased the density of lean cement mortars.

The principal advantages shown to result from the use of lime in cement mortars are an increase in workability and a reduction in cost. While a cement-gaged lime plaster retains much of the workability of straight lime plaster, the presence of the cement gives it greater strength and a shorter time of set.

Mr. Johnson recommends that when one is about to prepare a mortar, it is well to consider what are its requirements for the work in question. It may be found that a desirable change in one property results in disadvantages in others. That choice of proportions then must be made which will result in the best possible compromise. He also reminds us that exact duplications of results are not to be expected where other brands of materials or differently graded sands are used, with different manipulation and different storage conditions.

Zonolite, a New Light-Weight Insulator

Mineral Product from Montana Weighs Only 7 Lbs. per Cubic Foot and Has Good Fire Resisting Qualities

By James Keeth

ZONOLITE is a new insulating material of exceedingly light weight—7 lb. to the cubic foot. In the raw state it looks something like black mica (biotite). Heated in the flame of a match it swells rapidly and assumes a golden color which is permanent. It is not given in Ford's revision of Dana's Mineralogy dated 1922. In composition it contains the same elements as biotite mica, according to the analysis given here, but the proportions are different. The new material, from its light weight and its peculiar structure, would seem to have an important place among insulating and sound-proofing substances. Already a market has been developed in the United States and Europe. The mineral is one that should be sought for elsewhere.

MY attention was first attracted to the zonolite deposit in the spring of 1921. An old prospector happened to come into my office and during the course of our conversation he remarked that he had, on his last trip in the hills, seen a "fish scale mine." Asked for an explanation, he said that he did not know what the material was, but that it looked like black mica, and he declared that there was an immense amount of it, and that it was located about nine miles from Libby, a town in northwestern Montana.

I wrote to the owners for some of the material and they responded with a generous sample. It appeared to be a specimen of mica, black in color, except for a sort of waxy texture, in small pieces, and with very little rock in it. While there was no apparent use for the material, it seemed that some use might be found, as all accounts agreed that thousands of tons of it were available, so it seemed worth while experimenting with. An analysis of the material determined that it was about 25% aluminum, 30% magnesia, with a small percentage of potash and about 40% insoluble, presumably silica. Attempts to grind it met with poor success owing to its toughness and waxy nature. After experimenting with it in various ways for two or three weeks, it occurred to me to try it with fire. The material immediately commenced to swell and assume a golden color. Further experiments determined that the ratio of expansion was about fifteen to one and that the final color was very nearly that of gold, although the amount of heat used and the free oxygen available had something to do with its color.

After heat treatment it is, of course, very light; as it weighs about 100 lb. per cubic foot in the raw state, it would weigh only about 7 lb. after heat treatment, according to its ratio of expansion. As a matter of fact, that is just about what it does weigh in the coarse lumps, but if broken up into smaller pieces the weight is greater. It is exactly opposite to most materials in that its weight increases in direct ratio to its fineness, down to about 40 mesh; finer than that it again becomes lighter. Just what causes the great expansion on the application of heat has never been satisfactorily determined. Most people advance the theory that it is caused by the water of crystallization, but as very little weight is lost in the process that theory does not seem to apply.

The heat treated material appeared to be well adapted to uses of thermal insulation, for the manufacture of wallboard, insulating plaster, for decorative uses and as a filler. It is fireproof to about 2500 deg. F. Attempts to interest manufacturers in the new material met with poor success for some time. Many of them expressed interest in it and some made experiments looking to its use, but not knowing how it should be used most of these attempts met with failure.

Prolonged experimentation proved that it could be used as a kalsomine, or water paint; as an insulating plaster to be used on walls in place of common plaster and with many times the insulating and sound-deadening efficiency of common plaster (and at very little increase in cost); for the insulation of safes and vaults, cutting down weight greatly and increasing their resistance to fire; for use on wall paper, giving a very pleasing effect; as a substitute for ground mica in various capacities, and for some other uses.

A company was formed to acquire the ground on which this deposit was located; a survey and report by C. L. Wickstrom, mining engineer, gave the probable extent of the deposit, as determined by open cuts and surface openings, as being approximately 1800 ft. in width by 3000 ft. in length; its depth has been determined by tunnel work to be at least 100 ft. and how much deeper no one knows. Allowing one-third for waste, which seems liberal, these dimensions would show a tonnage of several millions of tons, and no one who has seen the deposit has ever expressed a doubt that there are several millions of tons practically "in sight."

The next step was the building of a truck road to the deposit. This required about two miles of road, ascending in that distance about 1500 ft. Ore bins were constructed and facilities provided for economical handling. At the present time the material is mined from stopes in the tunnel, and loaded in mine cars by means of chutes. It is then trammed outside and dumped in an ore bin above the truck road; from there it is hauled by truck to Libby, the shipping point.

It was early recognized that the marketing of this material depended much on a favorable freight rate as there was a rail haul of from 1500 to 2500 miles to the central and eastern parts of the United States, where its greatest use would be found. It would seem that most everything that is movable had at one time or another been shipped by rail and would, therefore, have a rate, but here was a new one; unclassified, unhauled and hence without a rate. Long negotiations with the railroad finally secured a rate that would permit the material to be delivered to the Atlantic coast, or points between at a low price.

From the nature of zonolite, as the new material was named, it could be much more easily and cheaply shipped in the raw state as mined, than after it had been heat-treated and rendered light and fluffy, but no manufacturer could use it in its raw state, therefore, a heat treating plant had to be designed and built. Cheap fuel was essential, so the heat-treating plant was located near a large sawmill, and designed so that it could utilize the sawdust, shavings and other waste from the sawmill.

The initial plant was a rather crude affair, with a furnace 4 by 15 ft. in size, built on a slope so the zonolite could be easily worked through from the high to the low end. The bottom was made of heavy cast iron plates, and heated from a dutch oven at the high end, the flame passing entirely under the bottom of the furnace and back over the top and out the stack. This worked well, but it was soon evident that cast iron could not stand the heat required to treat the material efficiently. After a few days' use the bottom plates so warped that they fell out and the bottom of the furnace had to be rebuilt with fire brick. This construction, of course, required more fuel to heat it to the red heat required in the process, but it worked and the furnace was able to handle

Mines and shipping bins of the Zonolite Co. near Libby, Mont.

the zonolite in carload quantities, although it required much labor for rabbling the charge and working it through the furnace.

After the heat treatment the expanded material was discharged on the floor from the low end of the furnace and picked up by a suction fan, through an 8-in. pipe and discharged into a storage bin from which it was afterward loaded into railroad cars in the same manner. In lifting the zonolite by suction any rock impurities were supposed to be left on the floor to be thrown out as waste. In practice, however, it was found that some of the smaller pieces would be picked up by the fan. Most of these were caught by a trap in the air pipe, but in cases where it was required that the product should be absolutely free from grit it was found necessary to give it still another air treatment.

In passing through the fans the zonolite was broken up so most of it would pass through a four mesh screen, although, of course, some lumps remained. This breaking up process was fortunate in that it enabled us to get the minimum weight (20 tons) in a car, which could not be done with the coarse material. A 50-ft. automobile box car, with a cubical capacity of about 4600 cu. ft. will hold the minimum tonnage if filled to the roof, when it is blown in as explained.

In time some market developed for zonolite ground to fine meshes. This brought on another difficulty, as no grinder could be found that would satisfactorily grind zonolite to a fine mesh. Any grinding mechanism designed to grind or pulverize rock will simply flatten zonolite except hammer mills, which beat it into a heavy dense powder, spoiling its color and rendering it unfit for use. Therefore, a spiked cylinder, revolving at a high rate of speed was used for preliminary grinding, down to 10 mesh, and another with a rasping surface for grinding to finer meshes. These work very well, and with some improvements will be able to handle a large tonnage, making a beautiful product, light in weight and of golden color. The finer material is sacked for shipment in large paper bags, if for carload shipment, and in jute sacks if for L. C. L. shipment.

The demand for zonolite is increasing, as it becomes better known and used for various purposes. Shipments are being made to several points in the United States and to Europe, and it seems probable that in time it will have a wide use.

The Zonolite Co. is preparing to install a new plant, consisting of a large rotary kiln, pulverizing and screening equipment, storage bins of carload capacity for each of the various meshes of material turned out, storage for raw material, elevating and handling equipment, etc., which will give it large capacity.

Mining engineers of note who have inspected the deposit of zonolite have been much interested in the size and occurrence of it and at its peculiar properties. While it looks like black mica, and was originally so classified, the fact that the deposit is so large and occurs in such a pure state, and is of such a peculiar nature, makes them wonder that it had not been properly investigated before.

Production of Feldspar in 1925

THE crude feldspar sold or used by producers in the United States in 1925 amounted to about 184,100 long tons, valued at about $1,306,300, according to a statement prepared from reports received directly from producers and issued by the Bureau of Mines, Department of Commerce, in co-operation with the geological surveys of Maryland, New York, North Carolina and Virginia. These figures show a decrease of 10% in quantity and 13% in value compared with 1924. Feldspar was mined and sold in 1925 in 12 states, namely, Arizona, California, Colorado, Connecticut, Maine, Maryland, New Hampshire, New York, North Carolina, Pennsylvania, South Dakota and Virginia. The greatest feldspar-producing region is that which includes the Atlantic seaboard states, from Maine to North Carolina. This region reported about 93% of the total production and value in 1925. North Carolina, the leading state, reported about 41% of the total output; New Hampshire, the second state, reported 21%, and Maine, the third state, 15%. The average value per long ton in North Carolina was $6.52, in New Hampshire, $7.28, and in Maine, $9.04.

Except for minor purposes feldspar is prepared for use by grinding. This work is done principally by commercial mills; only a very small portion is ground by users in their own mills. In 1925 there were 32 commercial mills operated in 13 states, namely, California, Colorado, Connecticut, Illinois, Maine, Maryland, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania and Tennessee. These mills reported 212,300 short tons of ground feldspar sold, valued at $3,597,800, or $16.95 a ton, compared with 189,780 short tons, valued at $3,283,170, in 1924, an increase of 12% in quantity and 10% in value. Of this quantity 184,300 short tons, valued at $3,011,800, or $16.34 a ton, was domestic feldspar, and 28,000 tons, valued at $586,000, or $20.93 a ton, was Canadian feldspar. Canadian feldspar was ground in three states in 1925—New York, Ohio and Pennsylvania. These figures represent increases in production and value of both domestic and Canadian feldspar as compared with 1924.

The production of crude feldspar by states in 1924 and 1925 is shown in the following table:

CRUDE FELDSPAR SOLD BY PRODUCERS IN THE UNITED STATES IN 1924 AND 1925

State—	1924 Long tons	1924 Value†	1925* Long tons	1925* Value†
Arizona	(‡)	(‡)	(‡)	(‡)
California	8,027	$62,344	6,000	$49,800
Colorado	(‡)	(‡)	(‡)	(‡)
Connecticut	6,572	51,422	10,300	71,200
Maine	29,912	271,354	28,400	256,700
Maryland	4,854	25,020	4,700	26,400
New Hampshire	39,425	324,638	38,300	278,700
New York	13,839	108,751	10,400	70,400
North Carolina	97,075	640,403	75,600	490,200
Pennsylvania	1,481	4,763	1,300	4,700
South Dakota	(‡)	(‡)	(‡)	(‡)
Virginia	(‡)	(‡)	(‡)	(‡)
Undistributed	3,587	20,644	9,100	58,200
	204,772	1,509,339	184,100	1,306,300

*Figures for 1925 are preliminary and subject to revision.
†Value at mine or nearest shipping point.
‡Included under "Undistributed."

A Large Western Phosphate Operation

Idaho Phosphate Company and Bear Lake Phosphate Company Recently Combined

THE phosphate mine of the Idaho Phosphate Co. is situated about three miles west of Paris, the county seat of Bear Lake County, Idaho. The company's own railroad connects the mine with Paris, and a branch of the Oregon Short Line railroad connects Paris with Montpelier, a distance of 10 miles. Montpelier is a station on the main line between Granger, Wyoming and Pocatello, Idaho.

The Paris mine is located on the west limb of a syncline, the axis of which passes north and south through the middle of sections 9 and 4. The strike of the phosphate beds is north 7 deg. west. Normally the dip would be eastward, but an overthrust fault coming from the west has overturned them until they dip 44 deg. west.

The beds of phosphate are a part of phosphoria formation and are consequently sedimentary in origin; for this reason they are very uniform, both in quality and thickness for a long distance along the strike and dip. The "gray rock" is of light gray to brown color, medium grained and fairly firm texture. It is free drilling. Its thickness averages 5 ft., and the B. P. L. contents approximate 72%.

The "black rock" is coaly black in color, medium to coarse grained and fairly firm. The thickness of the bed averages about 6 ft. and the B. P. L. contents approximate 72%.

A standard gage railroad spur has been built up Paris Canyon to the mine; the ore is loaded into railroad cars at the crushing and drying plant (the pulverized and dried ore in box cars and run-of-mine in gondolas) weighed on an official track scale belonging to the company. All equipment and supply shipments are delivered by railroad to the siding at the mine.

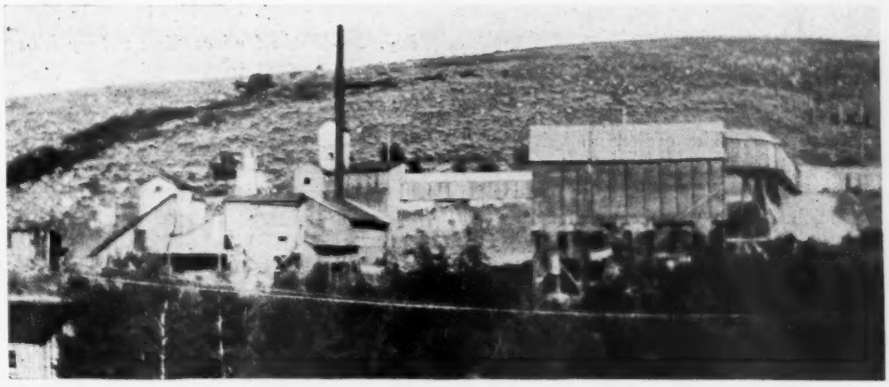
Complete equipment has been installed to carry on all modern mining, milling and pulverizing, and suitable housing conditions for offices, boarding house and living quarters for labor. Electric power is used for all purposes.

The property at Paris has been developed by an adit tunnel 2500 ft. long, by a winze 200 ft. below the level of the adit tunnel, proving the existence of the phosphate to this depth.

The Bear Lake property is developed by an adit tunnel approximately 1000 ft. on the vein of gray phosphate. Consolidation of the Bear Lake and Idaho Phosphate Co. properties will give approximately 4½ miles along the vein of the phosphate beds.

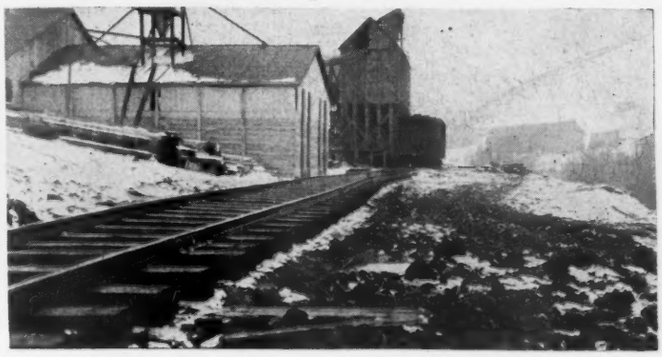
It is contemplated by the officials of the Idaho Phosphate Co. to sink a shaft on the property and ship all the ore from both properties over the railroad spur on the above-mentioned property. By sinking the shaft to a depth of 400 ft. it will develop on the gray vein alone, it is said, approximately 23,000,000 tons of phosphate. Government engineers are said to have estimated the phosphate to go to a depth of 2000 ft. or more.

Ray C. McIlwee, general manager



General view of the pulverizing mill and crude rock storage bins of the Idaho Phosphate Co.

View from mine entrance showing store house, employes' cottages, and part of the mill



Cars at crude rock bins. Another track has been recently added to that shown

Potash Deposits of Texas Offer Great Supply for Future

POTASH development in west Texas eventually may overshadow oil production there, in the opinion of M. T. I. Page, London mining engineer and geologist. Mr. Page represents both English and Dutch interests and has given considerable study to potash deposits, in which both nations are keenly interested as found in eastern New Mexico and west Texas. He expressed surprise that the government has so long deferred making appropriations for potash development.

Current Abstracts of Foreign Literature

Hydraulic Properties of Blast Furnace Slags

A very interesting article on certain thermal investigations of blast furnace slags is published in *Mitt. Forschungsinstitut Huettenzement Industrie,* 1925. This article deals with the latent energy of blast furnace slags and its relation to the single components of the three-component system, silica-lime-alumina. It was pointed out that the hydraulic properties of blast furnace slag depend on the development of a vitreous product which passes into the crystalline form when heated to about 800 deg. C., with the evolution of heat. The heat evolved during this transition is not a direct measure of the hydraulic properties of the slag cement, except with slags of the same composition, but depends on the extent of the vitrification, and may therefore be employed as an exact method for comparing the efficiency of various granulation processes from the point of view of the hydraulic properties of the slags.

The heat of hydration of the slag may be calculated from the heat of solution of the slag after deducting the heats of solution of the hydroxides which are produced by complete hydrolysis. The relative proportions of these can be determined from the chemical composition of the slag. The heat of hydration, however, bears no direct relation to the hydraulic properties of the slag.

Cooling of Rotary Kiln Cement Clinker

In Fig. 1 the rotary cement kiln is indicated at *a*. The clinker that drops out of the end of the kiln falls on the grate *c*, forming a pile of hot clinker which can be seen in the figure. A mixture of steam and air is then blown through this mass of hot clinker by the blower *d*. Thus the clinker is simultaneously cooled and hydrated. The water vapor which is removed from the steam-air mixture during the hydration process is furnished by water which is introduced into the cooler through the nozzles *f* and there converted into steam. The heat

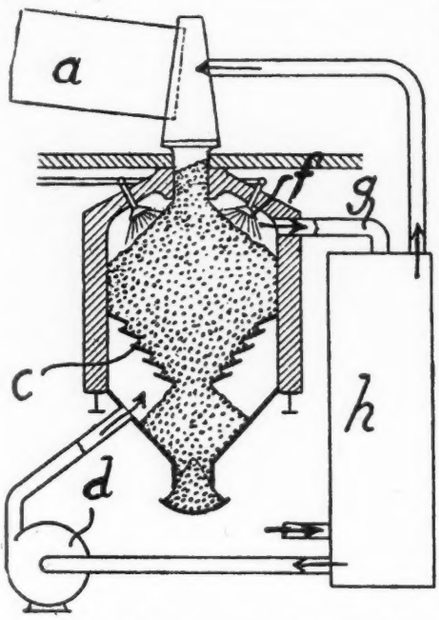


Fig. 1—Method of cooling rotary kiln cement clinker

that is removed from the hot clinker is used to good advantage. The waste gases are made to pass through the waste gas pipe *g* and then through an air heater *h* in which the air is preheated for use in the rotary kiln. This process and apparatus are patented in German patents Nos. 418,093 and 424,065.

Improvement in Cement Kilns

A number of interesting studies have been made on the operation of a kiln 3 m. in diameter and 70 m. long. One of the main points to be considered was the increase in the productive capacity of the kiln. It was determined that this was possible only when the material, before it reached the sintering zone, had been completely and uniformly prepared for clinkering by previous heating. It was found that due to the injection or shooting effect, both prepared and unprepared material reached this zone, and the results were unsatisfactory. The kiln was then made with a widened calcining zone, as may be seen from Fig. 2. The operation of the kiln was now much improved. There was no trouble with the sintering or burning of the cement. Furthermore, difficulties encountered due to the small temperature difference between the sintering and fusion of the cement particles were also overcome, and the consumption of fuel was decreased.

In Fig. 3 there is shown another type of rotary cement kiln which is used more particularly for the burning of cement manufactured by the wet process. This kiln is also used in the burning of aluminous cements. As may be seen from the figure, a second zone is built into the kiln near the calcining zone. This serves for the drying of the cement when the latter has been made by the wet process. When burning aluminous cements this zone serves for the purpose of overcoming a certain hydrate stage

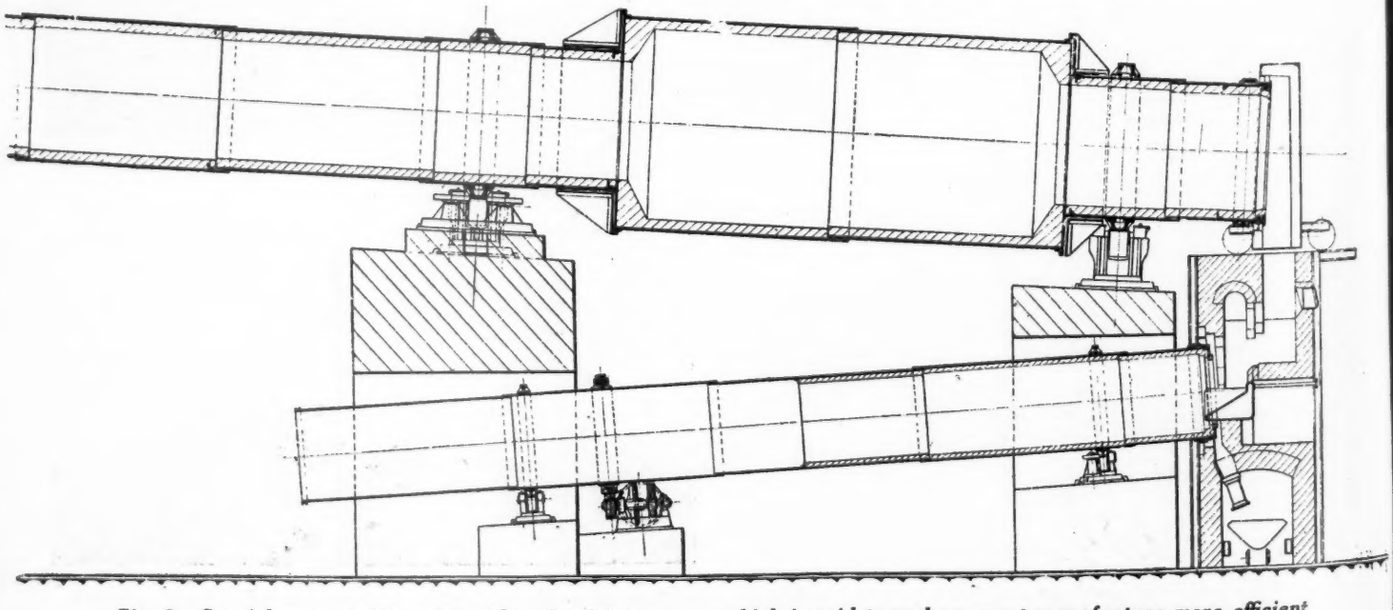


Fig. 2—Special type of kiln with widened calcining zone which is said to make cement manufacture more efficient

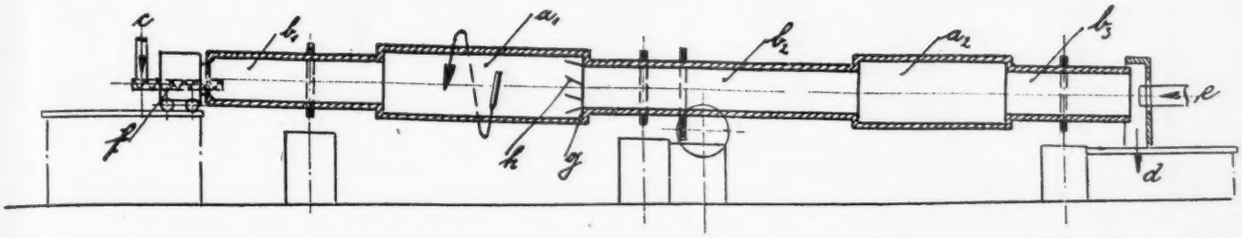


Fig. 3—Type of kiln designed particularly for wet process manufacture of portland cement. Note that the second zone is built into the kiln near the calcining zone. This is done so as to overcome in quick manner certain hydrate stages occurring in the burning

in the quickest possible manner. The rapid drying properties of this kiln are of particular importance in the burning of cement made by the wet process. The fuel consumption is much reduced.

For further details the reader is referred to the original article which was published in *Zement*, April 1, 1926, pages 246-7.

Titanium Cement

The manufacture of a cement containing titanium is discussed in French patent No. 591,653. The cement is made to contain 25% to 45% of lime, less than 20% of silicic acid and iron oxide, and from 10% to 60% of titanium oxide. The product is obtained by the melting together of mixtures of titanium iron minerals and limestone, or lime at a temperature of 1400 to 1500 deg. C. In this way, in addition to a very pure metallic iron, there are also formed liquid slags of the aforementioned composition. These slags are allowed to cool and thereafter they are pulverized and ground fine. These cements are particularly characterized by their very rapid setting and by the hardness and the resistance to chemical influences of the resulting products.

Effect of Cement Dust on Vegetation

A very thorough investigation of this subject, which has troubled cement makers all over the world, has been reported in *Zement*, volume 15, pages 39-42 and following. All sorts of plants were investigated and it was found that while a layer of cement dust has a certain effect in reducing slightly the assimilation powers of the leaves, nevertheless this film has a beneficial effect in preventing the too rapid evaporation of moisture during a dry spell. The pores of the leaves are not stopped up by the cement. It was also found that there was no bad effect of the cement dust on the fertilization of the flowers. On the other hand, the cement dust is an active agent in preventing certain pests from attacking the plants and also has a favorable action on the soil.

Magnesia Cement

Magnesium oxide and magnesium chloride are brought together in the presence of a filler which contains at least 30% of silica and which reacts with excess magnesium chloride. Suitable filling materials are those of the type that are obtained as residual materials in the manufacture of alum or aluminum sulphate. British Patent No. 243,197.

Magnesia from Magnesites

In Austrian Patent No. 101,328 there is described a process for the manufacture of magnesia from crystalline magnesites, the magnesia then being in proper condition for use in the manufacture of Sorel cement. Definite proportions of finely ground and lump magnesite are mixed and heated for a prolonged period of time at a definite temperature above the decomposition point of magnesite. The product contains, in addition to highly basic magnesium carbonate which sets rapidly with solutions of magnesium chloride or magnesium sulphate, dead-burnt magnesia which sets very slowly and increases the stability of the cement.

Rapid Determination of Lime in Cement and Cement Raw Materials

The analysis of cement and of the raw materials that are used in its manufacture is an important function of the cement plant chemist. He is often called upon to make these analyses at top speed and is therefore interested in any method that has for its purpose the shortening of the time required in making the regular cement analysis. The method which is described in *Zement*, 1926, pages 181-4 is concerned with the determination of the percentage of lime in the cement as well as in the cement raw materials.

After explaining the preliminary experiments which were made in the effort to devise a quick method for this purpose, the author describes the following method which was found to give satisfactory results. A sample of the ignited material weighing 0.3 gram is taken and placed in a 50 cubic centimeter porcelain dish. Five cubic centimeters of fuming nitric acid are added, and the mixture was heated on a water bath, being stirred with a glass rod while reaction is going on. Then the excess nitric acid is allowed to evaporate but a complete evaporation with fuming avoided, as otherwise the silicic acid would be precipitated in such form so as to make the subsequent oxalic acid fusion difficult to carry out. The mass, which is still moist with nitric acid, must then be mixed with a large excess of finely pulverized oxalic acid with the aid of a glass rod, and then placed again on the water bath. The residual nitric acid as well as the nitrate formed will then be completely destroyed with the formation of much nitrogen oxide fumes. After reaction has stopped, the mixture is placed in an air bath and heated further at slowly rising temperature and finally brought up to the end temperature of 500 to 550 deg. C. in an electric furnace within a period of twenty to thirty minutes. After cooling the mass can easily be removed in its entirety from the porcelain dish or crucible and can then be brought into the decomposition beaker of the calcimeter. There the final determination of the calcium carbonate is made in the usual manner.

In this method of determining the carbonate content of the sample of cement, the calcium sulphate present has no effect on the results. This pertains as well to the magnesia present. A number of tests which were made with this method on artificial mixtures of lime carbonate and other salts generally found in the cement and raw materials indicated that the results were entirely satisfactory with the rapid method. The results obtained by this rapid method are generally low, as might be expected, and agree within 0.5% with those results obtained by the regular method of analysis.

Analyzing Cement Through X-Rays

Attempts have been made to apply the X-ray method of crystal analysis to highly polished surfaces of cement in order to obtain knowledge and identification of the constituents. Not yet practicable because of lack of apparatus and methods of producing good sized crystals in cement.—*Zement*, 1925 (421-2).

Portland Cement from Molten Slag

Lime, silica, ferric oxide, alumina and gypsum are added in the proportions required to form portland cement to the molten slag before it is tapped off from the slag chamber. The added substances may be introduced together with fuel and air through nozzles provided with several concentric outlets or through simple nozzles. German Patent No. 421,427.

Cement for Preserving Wood

Wood is coated with a thin layer of concrete, cement, plaster, mortar or like hardening material by first mixing the hardening material with a sterilizing aqueous solution, and either spraying the mixture on the wood or dipping the wood into the mixture. Solutions of rock salt, iron or copper sulphate, or of zinc or mercury salts are cited as examples of suitable solutions. British Patent No. 249,721.

Hints and Helps for Superintendents

Loading Sand from a Stockpile

A NUMBER of different ways of handling sand, gravel and crushed stone from stockpiles have been published in this department. A method which is especially applicable to sand is shown in the accompanying picture.

Sand is brought from the stockpile to the foot of the elevator for loading

The sand is run into the stockpile from the tipple that stands beside the track. Beyond the tipple and near the track is the structure shown in the picture which supports a belt-bucket elevator.

The boot of the elevator is below ground and the sand is brought to it by a scraper operated by a hoist. The scraper was made at the plant from a section cut from an old boiler. A well designed commercial scraper, such as is made by several manufacturers, would be better.

Wet sand as it runs from a tipple makes a flat pile and the advantage of a bucket of this type is that it can be easily arranged to drag in the sand from any part of such a pile to the elevator.

The small hoist that pulls the scraper may be seen in front of the house in the rear. The picture was taken at the plant of the Arkansas River Sand Co., Tulsa, Okla.

Signal Prevents Overloading Crusher

THE CRUSHING PLANT of the East St. Louis Stone Co., near East St. Louis, Ill., has a remarkably high capacity for the crushing equipment, which consists of a No. 6 Gates gyratory as an initial crusher and a No. 37 Kennedy gearless as a reduction crusher. This capacity is attained by a uniform, constant feed.

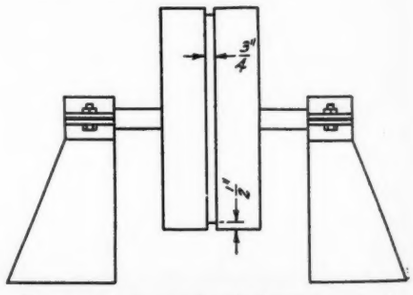
The plus 2-in. rejections from the sizing screen over the bins are chuted by gravity to the No. 37 Kennedy gearless. Occasionally in making a lot of small sizes of stone the stone flows to the reduction crusher faster than it can be taken care of. To avoid this the chute leading from the screen to the crusher has a delicately balanced section, so that the backing up of stone in the chute causes it to tilt downward and make an electrical contact, which causes an electric light bulb at the crusher to show a red signal. The men at the crusher then cease feeding it long enough for the chute to clear. When it does clear, and the load of backed-up stone is removed from the balanced section of the chute, the electrical contact is broken and the light goes out.

A Grindstone Kink

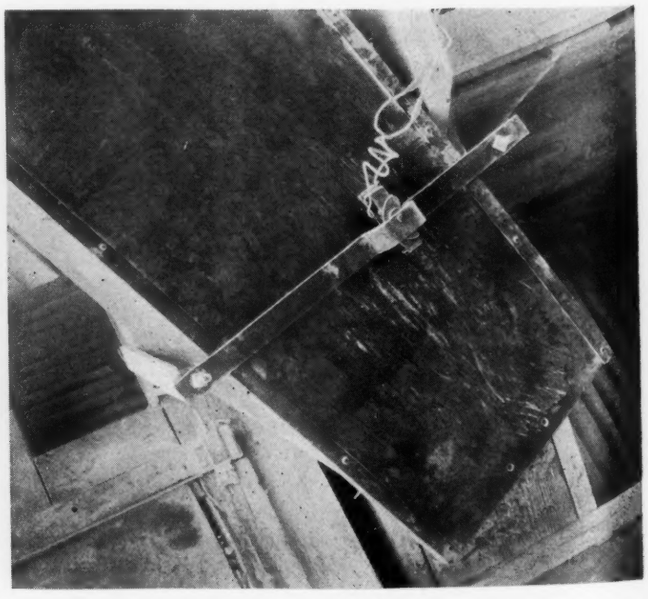
By CHARLES W. SLANEY
Superintendent, Memorial Art Co., St. Cloud, Minnesota

SINCE every plant has a grindstone, the following kink, while it is not new or novel, may not be known to many superintendents. The accompanying illustration tells the story.

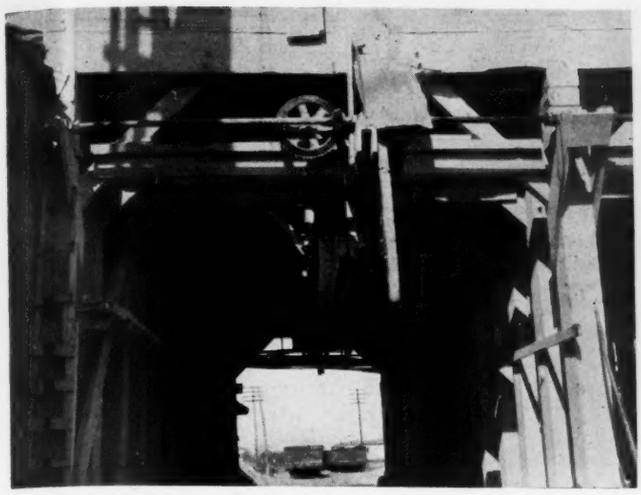
Placing a rut or groove about ½ in. deep deep and ¾ in. wide, in the center of a grindstone, will prevent the stone from becoming lop-sided and will save a great deal of time leveling it up again.

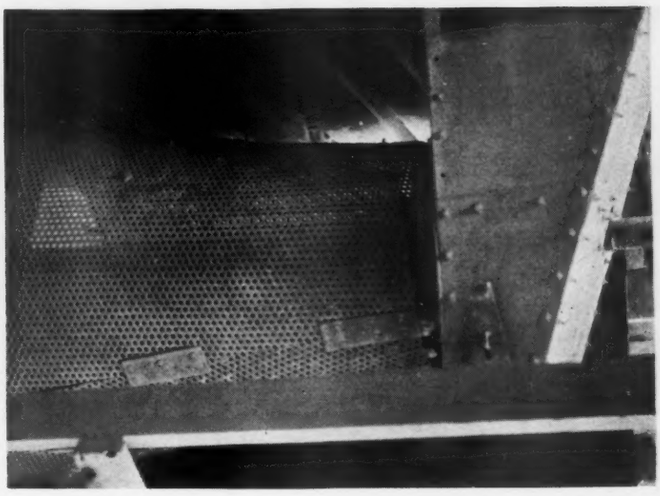


Groove in face of grindstone prevents it getting lopsided



Balanced chute feeding the crusher and its wiring. When the crusher is full it tilts downward and an electric contact is made which causes a red light to show as a signal to the men feeding the crusher to stop





The driving arrangement which operates the screens and (right) vertical chute feeding the screen. The conveyor below this screen carries off the fines

Device for Re-Screening Stone Before Loading Into Cars

THE re-screening of crushed stone or gravel as it is loaded into cars from bins is now a fairly common practice. The usual method is to use a gravity screen in the bottom of the chute through which the material flows into the cars. This has the advantage of requiring no head room. But a screen of this sort cannot be very efficient. The material going into the cars flows over it rapidly and the stream is too deep to allow all the fine particles to go down to the screen. Where water can be used in sprays, as in loading washed stone or gravel, the work is improved but with ordinary dry products the screen in the chute is an inefficient device.

It was from finding this to be true that the Hughes Stone Co. of Tulsa, Okla., was led to design and install a screening system that is efficient and that requires comparatively little headroom. The crushed rock flows out of the bin through a vertical steel chute at the bottom of which is a plate that turns the flow into a conical screen. The screen is set on a horizontal shaft and not on an inclined shaft as conical screens are usually placed in a gravel washing plant. The side of the screen provides the slope down which the stone flows to the car.

Underneath the screen is a belt conveyor on which the screenings fall. This conveyor takes them to a small elevator at the end which lifts them to the regular screenings bin of the plant.

There is a chute and screen for each bin and all the screens are on a common shaft. This is driven by a set of miter gears at the end. There are two lines of bins and the cross shaft drives the screens under both of them so that one motor on the cross shaft drives all the screens. It also drives the belt conveyors and the elevators through belts and pulleys.

The arrangement is simple and the headroom required is small. The screens are about 4 ft. in length, 2 ft. in diameter at the small end and 3 ft. at the large end. The screens are simply made. A piece of the right shape to roll to a cone is cut from perforated metal (¼-in. round holes) and after being rolled to shape the edges are fastened by riveting on pieces of strap iron, as shown in the picture. The shaft has two spiders for each screen to which the screen is bolted.

Washing Holes in Sand and Gravel Banks for Dynamite

By T. H. CALLAHAN
Superintendent, Mercer Sand Co., Jamestown, Pennsylvania

WE USE dynamite about four times a week to loosen the material in our sand bank. We do all of our blasting from the face of our bank as near the bottom as possible. The holes for the dynamite have an upward slope. We use 50 lb. of dynamite to a charge, and usually shoot just one charge at a time. If we use two charges we space them about 20 ft. apart, and shoot them simultaneously.

We have an 8-in. water main coming into our tipple. When we go to wash a hole in our bank for dynamite we shut off all valves at the tipple and throw all the pressure to the field and then we reduce our pipe that we use to wash with to 1¼ in. This gives us lots of pressure and washes the hole very fast. When the hole is washed, we take out the length of pipe and have another pipe the same length with a sharp bend on the end, or an elbow. We put this pipe in with bend or elbow down. This will soon wash a pocket below the line of the hole washed so that the dynamite will all go in a heap, which gives much better results than to have it scattered all the way out the hole. It will not blow out nearly so bad, and is not so dangerous, as your pipe is never jamming your dynamite. This also gives you the solid bank for resistance.

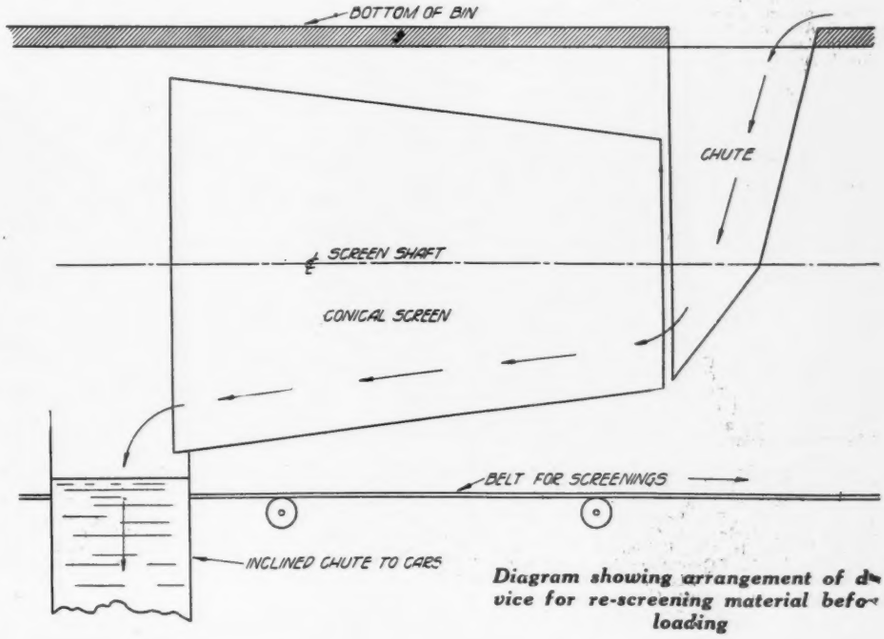


Diagram showing arrangement of device for re-screening material before loading

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

(These are the most recent quotations available at this printing. Revisions, corrections and supplemental information will be welcomed by the editor.)

Stock	Date	Par	Price bid	Price asked	Dividend rate
Alpha Portland Cement Co. (common)[2] new stock	June 17	100	42	44	1½% quar. Apr. 3
Alpha Portland Cement Co. (preferred)[2]	June 21	100	115	120	1¾% quar. Mar. 1
Arundel Corporation (sand and gravel—new stock)	June 21	No par	34¾	34¾	30c quar., Apr. 1
Atlas Portland Cement Co. (common)[3]	June 21	No par	44	47	50c quar. Mar. 1
Atlas Portland Cement Co. (preferred)	.....	100	.....	.....	2% quar. Oct. 1
Atlas Portland Cement Co. (preferred)[3]	June 21	33⅓	43	46	2% quar. Apr. 1
Bessemer Limestone and Cement Co. (common)[4]	June 18	100	135	142	1½% quar. Jan. 1, 4% ex. Jan. 1
Bessemer Limestone and Cement Co. (preferred)[4]	June 18	100	107½	108½	1¾% quar. Jan. 1
Bessemer Limestone and Cement Co. (convertible 8% notes)[4]	June 18	.....	118	125	8% annual
Boston Sand and Gravel Co. (common)[10]	June 19	100	60	75	2% quar. July 1
Boston Sand and Gravel Co. (preferred)[10]	Apr. 8	.....	.....	75	1¾% quar. Oct. 1
Boston Sand and Gravel Co. (1st preferred)[10]	Apr. 8	.....	.....	85	2% quar. Oct. 1
Canada Cement Co., Ltd. (common)	June 21	100	102½	103	1½% quar. July 16
Canada Cement Co., Ltd. (preferred)[11]	June 18	100	113½	114	1¾% quar. May 15
Canada Cement Co., Ltd. (1st 6's, 1929)[11]	June 18	.....	102	103	3% semi-annual A&O
Canada Crushed Stone Corp., Ltd. (6½s, 1944)[11]	June 18	100	93	96	
Charles Warner Co. (lime, crushed stone, sand and gravel)	June 21	No par	23	24½	50c quar. Apr. 12
Charles Warner Co. (preferred)	June 21	100	101	103	1¾% quar. Apr. 22
Charles Warner Co. (lime, crushed stone, sand and gravel) 7s, 1929[16]	June 19	100	103	105	
Cleveland Stone Co.	June 21	.....	163	.....	1½% quar., June 1, 1% ex. June 1
Connecticut Quarries Co. (1st Mortgage 7% bonds)[17]	June 18	100	104	.....	
Consolidated Cement Corp. (1st Mort., 6½s, series A)[24]	June 23	.....	95	98½	
Consolidated Cement Corp. (5 yr. 6½% gold notes)[24]	June 23	100	96	100	
Consumers Rock and Gravel Co. (1st Mort. 7s)[18]	June 17	100	98½	101	
Dexter Portland Cement Co. (6% serial bonds, 1935)[23]	June 21	.....	99	100½	
Dolese and Shepard Co. (crushed stone)[7]	June 23	50	89	91	$1.50 quar. July 1, $1 ex. July 1
Egyptian Portland Cement Co. (7% pfd. with com. stock purchase warrants)[21]	June 21	97	101	.....	1¾% quar. July 1
Egyptian Portland Cement Co. (common)[21]	June 21	18	20	.....	40c quar. July 1
Egyptian Portland Cement Co. (warrants)[21]	June 21	10	15	.....	
Giant Portland Cement Co. (common)[2]	June 21	50	30	35	
Giant Portland Cement Co. (preferred)[25]	June 21	50	45	47	3½% s.-a. June 15
Ideal Cement Co. (common)	June 21	No par	70	74	$1 quar. July 1
Ideal Cement Co. (preferred)[6]	June 17	100	107½	108½	1¾% quar. July 1
International Cement Corporation (common)	June 21	No par	57¼	58	$1 quar. June 30
International Cement Corporation (preferred)[3]	June 20	100	103¼	103¼	1¾% quar. June 30
International Portland Cement Co., Ltd. (preferred)	Mar. 1	.....	30	45	
Kelley Island Lime and Transport Co.	June 21	100	116	121½	$2 quar. July 1
Lawrence Portland Cement Co.[3]	June 22	100	100	110	2% quar.
Lehigh Portland Cement Co.[6]	June 21	50	85½	87½	1½% quar.
Lyman Richey Sand and Gravel Co. (1st Mort. 6s, expire serially up to 1930)[13]	June 18	100	99	100	
Lyman Richey Sand and Gravel Co. (1st Mort. 6s, expire serially from 1930 to 1935)[13]	June 18	100	97	99	
Michigan Limestone and Chemical Co. (common)[6]	June 21	.....	24½	26	
Michigan Limestone and Chemical Co. (preferred)[6]	June 21	.....	23½	24½	1¾% quar. Apr. 15
Missouri Portland Cement Co.	June 21	25	56	58	25c quar. May 31, 25c ex. May 31
Monolith Portland Cement Co. (common)[9]	June 17	.....	11	11½	
Monolith Portland Cement Co. (units)[9]	June 17	.....	27	28	
Monolith Portland Cement Co. (preferred)[9]	June 17	.....	8	8½	
Nazareth Cement Co.[20]	June 17	No par	38	40	75c quar. Apr. 1
Newaygo Portland Cement Co.[1]	June 18	.....	110	120	
New England Lime Co. (Series A, preferred)[14]	Jan. 29	100	96½	99	
New England Lime Co. (Series B, preferred)[22]	June 21	100	92	95	
New England Lime Co. (V.T.C.)[22]	June 21	.....	35	38	
New England Lime Co. (6s, 1935)[14]	June 18	100	99	100	
North American Cement Corp. 6½s 1940 (with warrants)	June 21	.....	96	96	
North American Cement Corp. (units of 1 sh. pfd. plus ½ sh. common)[19]	Apr. 8	.....	94	99	2 mo. period at rate of 7%
North American Cement Corp. (preferred)	Dec. 31	.....	.....	.....	1.75 quar. May 1
Pacific Portland Cement Co., Consolidated[5]	June 16	100	85	89	½% mo.
Pacific Portland Cement Co., Consolidated (secured serial gold notes)[5]	June 16	.....	99¾	100¼	3% semi-annual Oct. 15
Peerless Portland Cement Co.[1]	June 18	10	5¾	6¼	
Petoskey Portland Cement Co.[1]	June 21	10	9¼	9⅞	1½% quar.
Rockland and Rockport Lime Corp. (1st preferred)[10]	May 25	100	98	98	3½% semi-annual Feb. 1
Rockland and Rockport Lime Corp. (2nd preferred)[10]	Apr. 8	100	.....	70	3% semi-annual Feb. 1
Rockland and Rockport Lime Corp. (common)[10]	Apr. 8	No par	.....	50	1½% quar. Nov. 2
Sandusky Cement Co. (common)[1]	June 21	100	106	124	$2 quar. Apr. 1
Santa Cruz Portland Cement Co. (bonds)[5]	June 16	.....	106	.....	6% annual
Santa Cruz Portland Cement Co. (common)[5]	June 16	50	80	.....	$1 quar. $1 ex. Dec. 24
Superior Portland Cement, Inc. (Class A)[20]	June 19	42½	43½	.....	
Superior Portland Cement, Inc. (Class B)[20]	June 19	20½	21½	.....	
United Fuel and Supply Co. (sand and gravel) 1st Mort. 6s[27]	June 4	100	99¾	100	
United Fuel and Supply Co. (sand and gravel) 6% gold notes[27]	June 4	100	98¾	99	
United States Gypsum Co. (common)	June 24	20	154¼	155	2% quar., $1 ex. May 31
United States Gypsum Co. (preferred)	June 19	100	116½	116½	1¾% quar. June 30
Universal Gypsum Co. (common)[3]	June 24	No par	14	14½	
Universal Gypsum V.T.C.[3]	June 24	No par	13¾	14¼	
Universal Gypsum Co. (preferred)[3]	Aug. 5	.....	76	.....	1¾% quar. Sept. 15
Universal Gypsum Co. (1st Mortgage 7% bonds)[3]	June 24	.....	99	(at 6½%)	
Union Rock Co. (7% serial gold bonds)[18]	June 17	100	99	101	
Wabash Portland Cement Co.[1]	Aug. 3	50	60	100	
Wisconsin Lime and Cement Co. (1st Mort. 6s, 1940)[15]	June 21	100	98½	100	
Wolverine Portland Cement Co.	June 21	10	6	7	2% quar. Aug. 15

[1]Quotations by Watling, Lerchen & Co., Detroit, Mich. [2]Quotations by Bristol & Willett, New York. [3]Quotations by True, Webber & Co., Chicago. [4]Quotations by Butler, Beading & Co., Youngstown, Ohio. [5]Quotations by Freeman, Smith & Camp Co., San Francisco, Calif. [6]Quotations by Frederic H. Hatch & Co., New York. [7]Quotations by F. M. Zeiler & Co., Chicago, Ill. [8]Quotations by De Fremery & Co., San Francisco, Calif. [9]Quotations by A. E. White Co., San Francisco, Calif. [10]Quotations by Lee, Higginson & Co., Boston, Mass. [11]Nesbitt, Thomson & Co., Montreal, Canada. [12]E. B. Merritt & Co., Inc., Bridgeport, Conn. [13]Peters Trust Co., Omaha, Neb. [14]Second Ward Securities Co., Milwaukee, Wis. [15]Central Trust Co. of Illinois, Chicago. [16]J. S. Wilson Jr. Co., Baltimore, Md. [17]Chas. W. Scranton & Co., New Haven, Conn. [18]Dean, Witter & Co., Los Angeles, Calif. [19]Hemphill, Noyes & Co., New York. [20]Quotations by Bond & Goodwin & Tucker, Inc., San Francisco. [21]Baker, Simonds & Co., Inc., New York. [22]William C. Simons, Inc., Springfield, Mass. [23]Blair & Co., New York and Chicago. [24]A. B. Leach and Co., Inc., Chicago. [25] A. C. Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [27]J. G. White and Co., New York.

QUOTATIONS ON INACTIVE ROCK PRODUCTS CORPORATION SECURITIES ON PAGE 72

Editorial Comment

The A. S. T. M. Meeting

The meeting of the American Society for Testing Materials, which is being held at Atlantic City, N. J., as this is written, is important to the rock products industries principally because of the change in cement specifications that is expected to be made. The 7-day and 28-day mortar strength requirement will be raised from 200 to 225 lb., and 300 to 325 lb., respectively, if the recommendation of the cement committee is followed. However, the effect of this proposed change has already been felt by the industry, as both makers and consumers of cement seem to think that the time to make a change has come, and most cement is made accordingly.

The survey made by the cement committee before advocating the change showed that of 1,000,000 samples tested in 1925 only 5% failed to meet the advanced strength specification. This is sufficient evidence that those engineers who held that the specifications were too low were correct.

Specifications for lime, gypsum and road building materials will also be considered.

The American Society for Testing Materials is one of the astonishing developments of modern industrial life. The idea that representatives of every shade of interest from buyer to seller might get together peacefully and form rules and regulations to insure standards of quality would not have appealed strongly to the business man of the middle years of the last century. It was only toward the closing years of the century that the need of some authority to control the quality of products became apparent, and it was then that this society and other organizations of the same kind came into being.

New High Records of Shipments

The peak loading of mineral aggregates usually comes in the fall, when construction crews are organized to highest efficiency and jobs are being hurried to completion. But now May has made a new record in sand and gravel movement. For the week ending May 29 the loading was 70,484 cars, an increase of 2823 cars over the previous high figures, which was for the week ending August 8 of last year.

Shipment of cement for May exceeded that of the same month last year by nearly a million and a quarter barrels, which on casual inspection looks like another record.

So altogether the month has given a good account of itself and has made up for the late start on the work of the season.

Compulsory Mine Dusting

We have known all along that the rock-dusting of coal mines was not a fad, nor the dream of some impractical philanthropist. Today there are more than 200 mines in the United States which have been rock-dusted, clear evidence that the American mining man recognizes the danger in the explosibility of coal dust, accepts the merits of rock-dusting in preventing and limiting explosions, and is doing his utmost to promote safety in mines. All honor to these men who have not haggled over a technicality and said that the law did not require it, but have gone ahead and made their mines as safe as is humanly possible.

But now the evidence in favor of rock-dusting is so clear and unmistakable that the hesitators are going to be forced into line—not by the laws of their states, but by a power in this case just as effective—the insurance men who are carrying their risks. Coal mine hazards have been so great that the underwriters doing business in this field have found it necessary to work together under the title of The Associated Companies; and it is this organization which has sent out word that after October 1, 1926, it will not insure for compensation any gaseous or dusty bituminous coal mine which is not rock-dusted. Policies covering such mines will be canceled on that date unless steps have been taken to comply with the order. It is also specifically stated that sprinkling or watering will not be accepted in lieu of rock-dusting. And the cost of treatment, according to a careful coal operator, is but $0.0014 per ton of output.

A Partial Victory?

It would seem that in the Western rate case now before the Interstate Commerce Commission, the shippers have already won a partial victory in advance of the decision which it is expected will be rendered next month. For in the brief filed by the carriers it is admitted that the railroads are willing to accept a 5% increase in place of the flat advance of 7½ cents per ton originally asked for.

On the other hand, this concession may only help to obscure the contention of the shippers that there is no justice in any increase whatever, especially in view of the fact that they in their own brief suggest that if an increase is to be made it should not be more than 5%.

With one side setting this figure as a maximum, and the other accepting it tentatively as a minimum, the commission, unless it has strong convictions one way or the other, is likely to work along the line of least resistance and render a 5% decision, in the hope that it will be accepted by both parties and thus keep the matter off the docket for a while.

QUOTATIONS OF INACTIVE ROCK PRODUCTS SECURITIES

Stock	Date	Par	Price bid	Price asked	Dividend rate
Coplay Cement Mfg. Co. (common) (4)	Dec. 16	.....	12½	.....	
Coplay Cement Mfg. Co. (preferred) (1)	Dec. 30	.....	70	.....	
Eastern Brick Corp. 7% cu. pfd.) (1)	Dec. 9	10	40c	.....	
Eastern Brick Corp. (sand lime brick) (common) (1)	Dec. 9	10	40c	.....	
Edison Portland Cement Co. (common)	Nov. 3	50	7½c(x)	.....	
Iroquois Sand & Gravel Co., Ltd. (2 sh. com. and 3 sh. pfd.) (1)	Mar. 17	.....	$12 for the lot	.....	
Edison Portland Cement Co. (preferred)	Nov. 3	50	17½c(x)	.....	
Lime and Stone Products Co. (1100 sh. pfd., $10 par and 700 sh. com., $10 par)	Feb. 10	.....	$66 for the lot	.....	
Missouri Portland Cement Co. (serial bonds)	Dec. 31	.....	104¾	104¾	3¼% semi-annual
Olympic Portland Cement Co. (g)	Oct. 13	.....	.....	£1⅝	
Phosphate Mining Co. (1)	Nov. 25	.....	1@5	.....	
Pittsfield Lime and Stone Co. (preferred)	.....	100	.....	.....	2% quar. Apr. 1
Rock Plaster Corp. (390 sh. com., no par) (1)	Mar. 17	.....	$12 for the lot	.....	
Simbroco Stone Co. (pfd.)	Dec. 12	.....	.....	.....	$2 Jan. 1
Tidewater Portland Cement Co. (common) (3)	Nov. 25	.....	8½	.....	
Vermont Milling Products Co. (slate granules) 5 sh. pfd. and 1 sh. com. (2)	Dec. 30	.....	$1 for the lot	.....	
Winchester Brick Co. (preferred) (sand lime brick) (5)	Dec. 16	.....	10c	.....	

(g) Neidecker and Co., Ltd., London, England. (1) Price obtained at auction by Adrian H. Muller & Sons, New York. (2) Price obtained at auction by R. L. Day and Co., Boston. (3) Price obtained at auction by Weilepp-Bruton and Co., Baltimore, Md. (4) Price obtained at auction by Barnes and Lofland, Philadelphia, Pa. (5) Price obtained at auction for lot of 50 shares by R. L. Day and Co., Boston, Mass. (x) Price obtained at auction by Barnes and Lofland, Philadelphia, on November 3, 1925.

U. S. Gypsum Advances with Expansion News

DESPITE the somewhat reactionary tone of the Chicago market during the week ending June 19, U. S. Gypsum stock was bought in fairly good volume with offerings very slight. Over 6100 shares were traded in during the past week. The price has advanced from 140 on June 5 to 154¼ on June 24, a gain of 14¼ points.

Among the explanations advanced for the heavy buying recently is that it has been for interests who expect the price to go materially higher before the November directors' meeting, when the stock extras have been declared in the past few years. An additional factor is more stable conditions in the labor situation in Chicago, improving the outlook for the continuation of heavy building operations.

However, the Chicago labor situation has comparatively little effect on U. S. Gypsum owing to the nation-wide scope of its business.

The gain may be better attributed to the recently announced expansion program (this issue, p. 36) that the company proposes to carry through in 1926 and the general good business the company has enjoyed during the present year and which is expected to continue.

Certain-Teed Products Dividends

AT the regular monthly meeting of the directors of the Certain-Teed Products Corp. June 2 the usual quarterly dividend of $1.75 per share on first and second preferred stocks and $1 per share on common stock were declared, payable July 1.

In a letter to the stockholders, G. M. Brown, president of the company, stated:

"As was reported at the meeting, the company shipments for the year to date are the largest that they have ever been for any like period of any year. The net earnings for the year to date exceed the requirements for the pro rata dividends and first preferred sinking fund to date. The early part of the year has seldom been one of our favorable earning periods; the fall is usually our best period.

"We are in process of building a modern up-to-date plasterboard plant which will compare most favorably with the best in the industry. Our trade has a great need for this product which is now being sold to our customers by other manufacturers. We hope to reach production in this new plant by September. It should be one of our most profitable items, and will be sold without extra sales cost and with the further advantage of helping our present lines by supplying pressing needs to our customers. As a consequence of these improvements and extensions, which are being completed during the year, we should secure additional profits of substanial benefit to the common stock."

Canada Cement Common Dividends May Be Increased

ACCORDING to various reports, the earnings of the Canada Cement Co.'s investment in gypsum, glass and plaster subsidiaries will, it is said, eventually be large enough to take care of the company's fixed charges and preferred dividend requirements. Should this take place, the company's earnings from its production of cement may eventually become entirely applicable to the common stock.

Asbestos Corporation Bonds Offered

CREDIT-CANADA, LTD., are offering at 90 and interest, to yield 6¾%, $200,000 general mortgage 30-year 6% sinking fund gold bonds.

Dated January 1, 1926; due January 1, 1956. Principal and interest (J. and J.) payable at Royal Bank of Canada, Montreal, Toronto, Halifax, Winnipeg or Vancouver. Redeemable, all or part, on any interest date on 60 days' notice at 105 and interest. Denominations $100, $500, $1000. Royal Trust Co., Montreal, trustee.

Company—Has been formed to acquire the undertaking and assets of the following companies: Asbestos Corp. of Canada, Ltd.; Consolidated Asbestos, Ltd.; Federal Asbestos, Ltd.; Thetford Vimy, Ltd.; Maple Leaf Asbestos Corp., Ltd.; Asbestos Mines, Ltd.; Black Lake Asbestos and Chrome Co., Ltd. The consolidation will permit a substantial reduction in extracting, milling and selling costs and place the industry generally on a more stable and profitable basis. New company will own approximately 30,000 acres of asbestos bearing lands estimated as sufficient to maintain the present output for at least 100 years, with maple milling equipment to take care of the present demands of the company.

Earnings—For the eight years ended December 31, 1925, before making provision for depreciation of plant, exhaustion of minerals and Dominion taxes, earnings available for bond interest averaged $1,189,824. Interest on all of the outstanding bonds of the new corporation, including this issue, amounts to $468,000. Net earnings available for bond interest in the above-mentioned period after ample depreciation and depletion allowance and all charges averaged $964,000. By closing down unprofitable mills and diverting all the business to the mills with low producing costs, a substantial increase should be shown in the earning capacity of the consolidation.

Sinking Fund—The trust deed will provide for a cumulative sinking fund of 1% per annum from January 1, 1930, to 1936 and 1½% per annum from January, 1937, to 1946 and 2% per annum from January, 1947, to 1956.

ASBESTOS CORPORATION CAPITALIZATION

Capitalization—	Authorized	Presently issued Not to exceed
6% first and refunding mortgage 15-years bonds	$3,000,000	$3,000,000
6% general mortgage 30-year bonds	10,000,000	4,784,135
7% preferred stock (including three management shares)	12,000,000	7,456,400
Common stock (no par value)	200,000 shares	200,000 shares

National City Bank Is Named Alpha Portland Registrar

THE National City Bank of New York has been appointed registrar of the 20,000 shares of the preferred stock, $100 par value, and 1,000,000 shares of common stock, without par value, of the Alpha Portland Cement Co.—*Chicago Journal of Commerce.*

Dividends Declared

Company	Rate	Payable
Canada Cement Co. (com.)	1½% qr.	July 16
Egyptian Portland Cement Co. (com.)	40c. qu.	July 1
Egyptian Portland Cement Co. (pfd.)	1¾% qu.	July 1
Ideal Cement Co. (com.)	$1 qu.	July 1
Ideal Cement Co. (pfd.)	1¾ qu.	July 1
Kelley Island Lime and Transport Co.	$2 qu.	July 1

Sand-Lime Brick Production and Shipments in May

A BEGINNING was made in the compilation and publishing of monthly statistics of the sand-lime brick industry in ROCK PRODUCTS, June 12, p. 53 (for April). The statistics for May are now available. Hereafter the statistics for each month will be published as soon as possible following the end of that month.

The prices noted in the June 12 issue have been criticised by a Detroit producer as misleading, since some are evidently retail prices and others dealers' prices. We know of no way to overcome this difficulty. The prices quoted are given by producers as the *average prices* for the month. If the producer is fortunate enough to do his own retailing, his price is naturally more. Consequently we will continue to quote, as we are, *average prices* for the benefit of the producer. Those in the trade, of course, know that such average prices are subject to discounts in special cases which can not be shown in any kind of a tabulation of average prices.

The tabulation below includes returns from 14 sand-lime brick companies, which is about one-third of the reported number of sand-lime brick plants in operation in the United States and Canada, but probably represents about half of the total output of sand-lime brick manufactured.

Sand-Lime Brick Statistics for May

Production, May, 1926	16,101,300 brick
Shipments by rail	4,983,550 brick
Shipments by truck	12,151,070 brick
Stocks on hand	7,310,925 brick
Unfilled orders	20,695,000 brick

The following are average prices of sand-lime brick for the month of May:

Average Price of Sand-Lime Brick for Month of May

	Plant Price	*Delivered*
Milwaukee, Wis.	.....	$13.00
Detroit, Mich.	$13.52	16.50
Toronto, Ont.	12.80	15.30
Saginaw, Mich.	12.00	.....
Minneapolis, Minn.	10.00	12.75
Woburn, Mass.	14.50	17.00
Flint, Mich.	12.50	.....
Michigan City, Ind.	10.50	.....
Dayton, Ohio	12.50	.....
Jackson, Mich.	10.00	12.00

The Sand Lime Products Co., Detroit, Mich., reports that over a million sand-lime brick were used in the Book-Cadillac hotel, Detroit's largest hotel. The new Savoy hotel, now under construction there, is being built largely of sand-lime brick. Other large buildings where sand-lime brick are being used are the Budd Wheel Co. factory, the Frontenac apartments and the Whittier apartment hotel.

This company has prepared some attractive advertising literature, samples of which we presume they will be glad to send to other sand-lime brick manufacturers. The Sand Lime Products Co. also advertised this year by taking part in the Annual Detroit Builders' Show, using as an exhibit a model home basement with walls of white sand-lime brick, on a full size scale, and equipped with every modern convenience. This exhibit demonstrated in several ways the superior qualities of sand-lime brick in making basements brighter, cleaner and dryer.

Canadian Sand-Lime Brick Plant Damaged by Fire

THE plant of the Leaside Brick and Sand Co., Ltd., Leaside, Ont., was destroyed by fire on June 20 with a loss of about $100,000. The insurance on the plant is $60,000. This plant was moved from Hepworth, Ont., a year ago and housed in permanent buildings. The plant had just started operation and George Robinson, superintendent, believes the fire started in one of the sand bins. The president's office is located in the York building, Toronto. R. J. Campbell is president.

Some Properties of Gypsum-Lime Mixes

In plastering it is common practice to use a mixture of calcined gypsum and lime putty for the finish coat. The lime employed may be either hydrated or quicklime. If the latter is employed, it is slaked on the job.

The properties of lime-gypsum mixes with reference to time of set, tensile and compressive strength, shrinkage and plasticity have been determined in which the composition has been varied by 5% increments from 100% lime to 100% calcined gypsum.

In view of the results obtained in this investigation, it is believed that the following conclusions are justified:

1. Quicklime and hydrated lime when added in small amounts to calcined gypsum accelerate the time of set. Maximum acceleration occurs when about 10% by weight of hydrated lime is present. Above 50% hydrated lime, retardation occurs, which becomes marked at about 70%, when the time of set approaches that of pure lime.

2. Hydrated lime in small amounts (less than 10%) increases the tensile strength of calcined gypsum. A calcined gypsum-hydrated lime mix, rich in hydrate (in excess of 85%) has a greater tensile strength than a mix of like composition containing an equivalent amount of quicklime.

3. The addition of lime to calcined gypsum in all amounts lowers the compressive strength. The compressive strength of gypsum-hydrate mix is greater than that of a gypsum-quicklime mix where the lime content is equivalent.

4. Lime may be added to calcined gypsum without affecting the shrinkage of the set mix, to a definite percentage, above which the further addition of lime increases the shrinkage.

5. Lime in all proportions increases the plasticity of calcined gypsum. — *Technical News Bulletin* of the U. S. Bureau of Standards.

Analysis of Lime Production in 1924

THE Bureau of Mines report on the lime production of 1924 has just been issued. As with all these reports, the figures are mainly of value as a record, because the conditions under which the 1924 production was obtained have changed and the figures for 1925 will show 11% to 12% increase. Nevertheless the report is interesting, especially the analysis that has been made showing the uses to which lime is put and the percentage of production going to each use. An appendix which gives an unusual value to this report contains a 1924 list of the lime manufacturers of the United States (grouped by sections) with the equipment at each plant and a note on the kind of stone burned and the fuel used.

The production of 1924, as most of our readers know, was about equal to that of 1923, the report showing a decrease of 3% in quantity and 1% in value. The largest producing states, Pennsylvania and Ohio, reported the greatest increase in production, showing that the use of lime is increasing in those parts of the country where it is most produced. Less plants reported, which is accounted for by the decrease in purely local kilns. Later reports will show a still further decrease in local operations, as the tendency of the business is to get into fewer and stronger organizations. The number of plants in operation declined from 906 in 1915 to 439 in 1924, while the production increased from 3,622,810 tons to 4,072,000 tons in the same period. The per plant average has hence been raised from 4000 tons per year to 9250 in round numbers.

Building consumed a little more than half the lime burned, 53.3%. Chemical uses took 40.67% and the remaining 6.1% was used in agriculture. As usual, metallurgy took the largest share of the chemical lime, 336,813 tons. With this should be included dead burned dolomite, classed as lime in this report, which was 328,659 tons. Paper mills took 300,101 tons. No other use of lime approached these in tonnage. The nearest was that of water softening, taking 92,000 tons.

Tonnages are given for 25 industries and an equal number are mentioned in a foot note as forming the "undistributed" users. The list contains such widely varying productions as those of artificial silk, asphalt paving mixtures and sheep dip. Alkali, bleaching powder, soap, sand lime brick, silica brick, glue and insecticides are among the products that are comparatively large consumers of lime.

The bureau's figures do not include lime that is bought as limestone by manufacturers and burned at the plant where it is used.

Peculiar Situation Occurs at Alpha Company's Ironton Limestone Mine

RECENTLY many newspapers have carried varying reports about 80 miners being overcome by gas at the Ironton, Ohio, limestone mine of the Alpha Portland Cement Co. According to these reports the gas accumulation was quite mysterious and officials unable to account for it. The editors, realizing that gas in a limestone mine was almost an impossible thing, wrote directly to the company officials and received the following reply from Gordon S. Brown, president of the Alpha company:

'The newspapers made a very great deal more out of the situation at Ironton than was warranted by the facts in the case. The mine was shut down at noon on Saturday and during the afternoon some rubbish, which had accumulated during the week, such as dynamite boxes, etc., was burned. The fan was stopped before all of the smoke and fumes from the fire had been expelled. Ordinarily, the fan would be started in the early hours Monday, but the man whose duty it was to look after this failed to start the fan with the result that the air was very bad when the men went down.

"The mine superintendent saw that something was wrong and immediately began sending the men up to the surface. He, himself, with two or three helpers stayed down longer in order to make sure that no one by accident was remaining inside, and he and one or two others were overcome, but quickly recovered when they reached the open air. The fan quickly expelled the dead air from the mine, and it was in shape to use again within a couple of hours. The hastily constructed emergency hospitals, the numerous doctors and nurses and men toppling over one by one were evolved from the reporter's imagination.

"You, of course, appreciate the fact that there could be no gas in this mine in the sense in which there is gas in the coal mines. The natural gas wells which are in this vicinity are well protected so that none of this gas has ever been observed in the mine.

"As a matter of interest, it is considered one of the safest mines of its class in the United States. It received honorable mention in the Bureau of Mines safety contest for 1925."

Tests Committee of Highway Officials Holds Meeting

A MEETING of the Committee on Tests and Investigations of the American Association of State Highway Officials was held at the U. S. Bureau of Public Roads in Washington on Monday and Tuesday, June 21 and 22.

This committee is under the chairmanship of H. S. Mattimore, engineer of materials, Pennsylvania State Highway Department, and is charged with the duty of preparing methods of tests and specifications for materials used in road construction. The standard and tentative standard methods of sampling and testing highway materials, as given in the U. S. Department of Agriculture Bulletin No. 1216, were prepared by this committee, and one of its principal duties at the meeting was to consider any possible changes or revisions in procedure as outlined in this bulletin or revisions thereto which were adopted at the last meeting of the committee in September, 1925. The committee also considered changes and revisions in its present tentative specifications for materials, with special reference to the new proposed specifications for strength of cement.

The Committee on Tests and Investigations also has under way a number of interesting research projects. These projects, which are being conducted co-operatively by its various members, include a study of the relation between the quality of portland cement as determined by the usual specification tests and the quality of the concrete in which the cement is used, a study of stone screenings in place of sand as fine aggregate in concrete, studies of the value of rail steel in reinforcing for concrete, studies of subgrade materials and methods of testing, and studies of methods for testing the stability of bituminous mixtures. Progress reports covering the use of stone screenings as fine aggregate and rail steel as reinforcing, which had already been made to the committee, were also discussed at the meeting.—*Highway Research News.*

Pumicite Beds Discovered in Kansas

A LARGE deposit of pumicite or volcanic ash has been discovered in McPherson county, Kansas, according to a local newspaper. Pumicite is in good demand as an abrasive in soaps, polishes, etc., and has recently been found to be useful in concrete work. There are comparatively few large deposits in the United States, the total mined in 1922 being only 45,000 tons, which came from Arizona, Nebraska and Kansas.

Elliston Gravel Company Sold by Receiver

CLAUDE E. GREGG, receiver for the Elliston Gravel Co., Elliston, Ind., has informed us that the entire plant and property has been purchased by Abe Hart of Sanborn, Ind. The equipment of the company consisted chiefly of a dredge equipped with 14-inch Morris sand and gravel pump, 300 hp., 2300 volt, General Electric motor; 1 30-ton Browning locomotive crane, completely equipped; 1 American 6-wheel, standard switching locomotive, completely equipped; 2 gravity screen plants; 1 rotary screen, complete; 1 vibrating screen and motor and other machinery and tools.

The Elliston company maintained a sales office at Bloomfield, Ind., and L. R. Henley was president. The capacity of the plant is said to be about 150,000 tons of washed and screened sand and gravel per year.

J. E. Jellick Made Pacific Coast Manager of Portland Cement Association

ACCORDING to recent announcement by William M. Kinney, general manager of the Portland Cement Association, J. E. Jellick has been promoted from the post of district engineer of the Los Angeles office to the position of manager of all the Pacific coast offices.

Mr. Jellick will have charge of the territory comprising California, Arizona, Oregon, Washington, British Columbia, southwestern and western Nevada and northern Idaho. His headquarters will be at the San Francisco office of the association, 785 Market street.

Amos H. Potts, association representative, has been appointed to fill the post made vacant by Mr. Jellick's promotion. Mr. Potts will assume charge of the Los Angeles office at 548 Spring street.

Both Mr. Potts and Mr. Jellick have been with the association for many years and had been successfully engaged in engineering for a number of years previous to joining the association.

Raccoon Island Boundary Case to Go to State Supreme Court

LITIGATION between the Union Sand and Gravel Co. and the Wilson Sand and Gravel Co., both Huntington, W. Va., firms, over the boundary of Raccoon Island in the Ohio river, was resumed again recently.

A petition seeking dissolution of the permanent injunction recently granted the Union Sand and Gravel Co., restraining the other firm from removing sand from above the low water mark on the island, was filed with Circuit Clerk Seamonds for certification to the state supreme court by attorneys for the Wilson company.

In the initial hearing, which terminated in the circuit court at Huntington a short time ago with the granting of the injunction, the Union Sand and Gravel Co. claimed that the Wilson company had removed 9600 cu. yd. of sand from above the low water mark on Raccoon Island.

A verdict for judgment for $288, the value of the sand, was returned in favor of the plaintiff together with the injunction restraining the Wilson company, defendants, from removing more sand from the island.

In deciding the case, Judge Shepherd held that the low water mark on an island is its boundary, and the boundary remains unchanged even if artificial river stages keeps the water above that point for indefinite periods.

The Union company charged the Wilson firm with taking advantage of the artificial stages of the Ohio river resulting from the government dams and removing sand from above the low water mark on the island.—*Huntington (W. Va.) Advertiser.*

St. Joe Company to Add Kiln and Hydrating Plant

THE extensive expansion program which is expected to more than double the plant capacity after completion has been started by the St. Joe Lime and Stone Co., Little Rock, Ark. The necessary machinery and motors for the installation of the new hydrating unit and the electrification of the entire plant has already arrived. The company will generate its own electric power.

The present plant has one kiln and produces about 125 bbl. per day, but another kiln will soon be added, which will increase the output to between 250 and 300 bbl. per day. The hydrating plant is being installed by the Schaffer Engineering Co., Pittsburg, Penn. It is of their newest type and has a capacity of about 35 to 40 tons per day. The total cost of the improvements will be about $25,000.

John O. Willson is president of the company and J. W. Trieschman, secretary and treasurer.

Plan 4-Kiln Lime Plant at Enterprise, Oregon

ACCORDING to the Enterprise, Ore., *Chieftain,* the Black Marble and Lime Co. are planning to erect a modern 4-kiln lime plant and hydrating unit at that place. The site decided on lies along the railroad running into the city. W. D. Demorest has been engaged as general manager of the company.

At first two kilns will be built and operated. Limestone will be hauled by trucks to the kilns until an aerial tramway from the quarry can be built. At present an old kiln of small capacity is being operated. According to company officials, tests made on the lime for this kiln show it to be of a good grade and quite comparable with that made at other places in the state.

The officers of the company are Howard J. Kressly, A. J. Warren and W. D. Demorest. Mr. Kressly and Mr. Warren are also officers of the Idaho Marble Co., Agatha, Idaho.

Florida Limestone Output Shows Large Gain

FLORIDA limestone quarries are producing an average of 30,000 tons of crushed rock daily, all of which is being utilized in building of streets and highways in the state, according to information obtained by the Florida State Chamber of Commerce and which was published in a local newspaper. The rock, which is bringing an average of $1 per ton at the quarries, is being produced largely in Marion county, although considerable quantities are originating in other sections.

The movement of the product by the railroads now is about 90% of requirements, as against 10% five months ago, and the transportation companies expect soon to be handling it on a 100% basis.

W. E. Carson Named Chief of Virginia Conservation Commission

WILLIAM E. CARSON of Riverton, Va., president of the Riverton Lime Co., will head the newly created Commission of Conservation and Development, according to an announcement by Governor Harry F. Byrd of Virginia. The chief executive said he would not name the remaining six members of the commission until a later date.

The commission which Mr. Carson will head was declared by Governor Byrd to be one of the most important in the state, and one of few similar commissions in the United States. Through its creation, the general assembly, at its last session, abolished the geological survey, the geological commission, the forestry commission and the water power development commission, these to become a part of the work of the new commission.

One of the principal duties of the Commission on Conservation and Development will be complete supervision over the Shenandoah National Park, Governor Byrd pointed out. It will have authority over all matters pertaining to the park as well as

William E. Carson

authority to investigate state parks. Another of its duties will be the handling of the $50,000 Virginia state advertising fund, and the development and conservation of all the state's resources.

"Mr. Carson is a nationally recognized business leader and has been connected with many national movements," Governor Byrd said in announcing the appointment. It was largely through Mr. Carson's efforts, the chief executive said, that the National Mines Bureau was established. He was chairman of the southern states during the period the Citizens' League of Reform of the Currency was educating the people to the reform that eventually resulted in the federal reserve system, the governor said.

Mr. Carson was for 15 years president of the National Lime Manufacturers' Association. During the world war he was connected with the war industry board, under whose charge there were some 1300 manufacturing plants. For four years he has been a member of the Hampton Roads Port Commission, where he worked zealously to bring about cordial relations between the tidewater and the valley sections. He has also been for a number of years a member of the State Democratic Committee and chairman of the Seventh Democratic Congressional Committee.—*Richmond (Va.) Times-Dispatch.*

Eastern Quarries Merge Interests

ACCORDING to the Meriden, Conn., *Record,* negotiations were completed recently for the merger of Bertolini Bros. of Bridgeport and New Haven and the Connecticut Valley Trap Rock Co. of Berlin and Granby, Conn., of which W. W. Deming of Meriden, Conn., is secretary and treasurer, and Thomas B. Lowe of Bridgeport, president.

The Bertolini company is being backed, it is reported, by a syndicate of New York bankers who plan to invest $500,000 in the associated enterprise. The greater part of this will be used to furnish additional modern equipment such as crushers, etc., at the Berlin and Granby quarries.

New Bulletin Issued by the National Crushed Stone Association

VOL. I, No. 1, of a Bulletin issued by the National Crushed Stone Association is at hand and its circulation is confined to the association's membership. The purpose of the Bulletin is said by the opening editorial paragraph to be to place in the hands of members definite information relative to the trend of affairs within the industry. About half of the contents is devoted to technical matters in connection with the use of stone, and the other half is given to a discussion of conditions which may affect the crushed stone industry and to a report of the recent arguments in the Western rate case. The weekly reading of so well prepared and interesting a bulletin is bound to be of advantage to every member of the association.

Portland Cement Output in May

Heavy Shipments Bring the Month's Total Well Above Same Month Last Year

MAY shipments of portland cement showed a large increase over the preceding month and are over 7% greater than the shipments made in May, 1925, according to statistics compiled by the Bureau of Mines, Department of Commerce. Production shows an increase of about 964,000 bbl. over the corresponding month last year. Stocks of finished cement are slightly lower, but are still about 16% higher than in May, 1925.

The following tables, prepared by the Division of Mineral Resources and Statistics of the Bureau of Mines, are compiled from reports for May, 1926, received direct from manufacturing plants except two for which estimates were necessary on account of lack of returns.

Clinker Stocks

Stocks of clinker, or unground cement, at the mills at the end of May, 1926, amounted to about 11,619,000 bbl. compared with 12,934,000 bbl. (revised) at the beginning of the month.

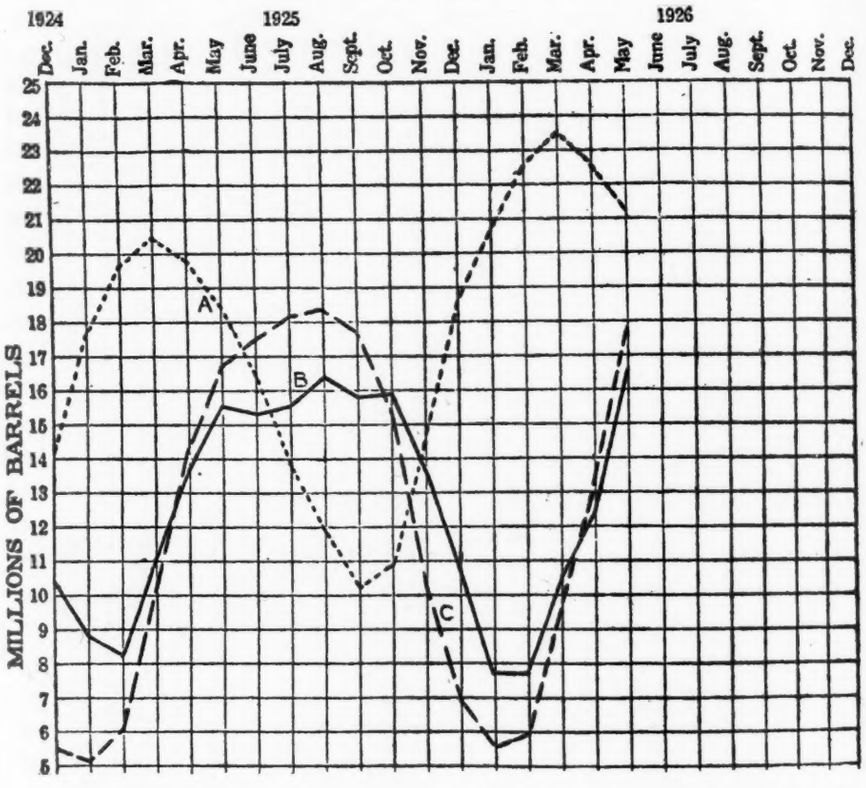
An estimate of the unground clinker by months is given below.

ESTIMATED CLINKER (UNGROUND CEMENT) AT THE MILLS AT END OF EACH MONTH, 1925 AND 1926, IN BBLS.

Month	1925	1926
January	7,017,000	9,074,000
February	8,497,000	10,931,000
March	9,962,000	12,284,000
April	9,731,000	*12,934,000
May	9,053,000	11,619,000
June	7,937,000	
July	6,961,000	
August	5,640,000	
September	4,561,000	
October	4,086,000	
November	5,013,000	
December	6,469,000	

*Revised.

MONTHLY FLUCTUATIONS IN PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT


1924
1925
1926
Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
MILLIONS OF BARRELS
25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5
A
B
C

(a) Stocks of finished portland cement at factories; (b) production of finished portland cement; (c) shipments of finished portland cement from factories

Distribution of Cement

The following figures show shipments from portland cement mills distributed among the various states to which cement was shipped during the months of March and April, 1925 and 1926:

PORTLAND CEMENT SHIPPED FROM MILLS INTO STATES IN MARCH AND APRIL, 1925 AND 1926, IN BARRELS*

Shipped to—	March 1925	March 1926	April 1925	April 1926
Alabama	177,510	158,310	191,451	215,372
Alaska	294	917	709	957
Arizona	27,009	54,916	31,264	40,257
Arkansas	72,198	66,712	94,695	62,646
California	1,029,118	1,156,509	1,027,744	850,124
Colorado	102,537	81,623	131,363	104,386
Connecticut	113,668	78,962	160,616	149,459
Delaware	21,766	22,386	41,573	48,259
District of Columbia	58,474	63,249	70,765	82,579
Florida	272,094	402,888	261,180	323,909
Georgia	140,634	139,781	112,250	171,829
Hawaii	1,500	24,737	2,250	27,999
Idaho	17,667	42,131	28,393	47,688
Illinois	846,638	569,978	1,467,815	961,090
Indiana	255,597	189,947	433,996	309,435
Iowa	161,164	116,367	284,477	219,716
Kansas	212,402	182,003	232,220	204,165
Kentucky	115,222	88,756	174,795	141,204
Louisiana	98,193	96,214	108,250	99,889
Maine	21,702	18,302	36,163	33,345
Maryland	143,291	132,720	207,844	199,076
Massachusetts	257,381	168,271	344,406	298,326
Michigan	437,712	399,036	859,815	582,549
Minnesota	173,618	164,405	321,854	296,040
Mississippi	35,778	58,308	48,174	65,511
Missouri	379,157	332,104	489,316	505,850
Montana	16,450	17,203	23,030	23,063
Nebraska	99,780	121,456	180,951	170,591
Nevada	7,254	8,824	10,767	8,478
New Hampshire	27,592	18,043	39,906	37,909
New Jersey	498,227	424,812	722,751	597,846
New Mexico	18,865	18,594	19,699	71,794
New York	1,159,830	1,026,883	1,717,441	1,633,792
North Carolina	200,097	271,422	277,616	357,978
North Dakota	16,589	23,260	38,937	39,039
Ohio	592,069	419,623	894,683	668,293
Oklahoma	203,161	206,766	201,886	220,016
Oregon	103,813	117,611	101,661	126,874
Pennsylvania	808,636	745,142	1,250,501	1,242,840
Porto Rico	.....	.....	.....	.....
Rhode Island	54,083	34,838	79,063	64,303
South Carolina	72,929	69,811	65,806	49,573
South Dakota	40,697	38,194	57,039	43,693
Tennessee	116,856	117,610	133,037	178,683
Texas	381,320	367,833	401,517	411,203
Utah	28,567	37,117	33,469	35,218
Vermont	10,312	5,052	25,353	14,358
Virginia	132,891	121,765	160,139	161,284
Washington	151,814	152,534	180,845	189,037
West Virginia	85,703	89,054	134,357	154,113
Wisconsin	142,620	155,826	358,379	277,196
Wyoming	16,358	12,225	19,981	13,887
Unspecified	46,236	36,878	34,875	56,420
	10,205,073	9,467,908	14,327,067	12,889,141
Foreign countries	73,927	71,092	66,933	71,859
Total shipped from cement plants	10,279,000	9,539,000	14,394,000	12,961,000

*Includes estimated distribution of shipments from three plants each month.

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1925 AND 1926, IN BARRELS

Month	Production 1925	Production 1926	Shipments 1925	Shipments 1926	Stocks at end of month 1925	Stocks at end of month 1926
January	8,856,000	7,887,000	5,162,000	5,672,000	17,656,000	20,582,000
February	8,255,000	7,731,000	6,015,000	5,820,000	19,897,000	22,384,000
March	11,034,000	10,355,000	10,279,000	9,539,000	20,469,000	23,200,000
First quarter	28,145,000	25,973,000	21,456,000	21,031,000	.....	.....
April	13,807,000	*12,401,000	14,394,000	*12,961,000	19,882,000	*22,640,000
May	15,503,000	†16,467,000	16,735,000	†17,950,000	18,440,000	†21,157,000
June	15,387,000	.....	17,501,000	.....	16,409,000	.....
Second quarter	44,697,000	.....	48,630,000	.....	.....	.....
July	15,641,000	.....	18,131,000	.....	13,896,000	.....
August	16,419,000	.....	18,383,000	.....	11,952,000	.....
September	15,939,000	.....	17,711,000	.....	10,247,000	.....
Third quarter	47,999,000	.....	54,225,000	.....	.....	.....
October	15,992,000	.....	15,309,000	.....	10,979,000	.....
November	13,656,000	.....	10,187,000	.....	14,534,000	.....
December	10,713,000	.....	6,917,000	.....	18,365,000	.....
Fourth quarter	40,361,000	.....	32,413,000	.....	.....	.....
	161,202,000	.....	156,724,000	.....	.....	.....

*Revised. †Includes estimates for two plants and subject to revision.

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN MAY, 1925 AND 1926, AND STOCKS IN APRIL, 1926, IN BARRELS

Commercial District	Production 1925—May	Production 1926—May	Shipments 1925—May	Shipments 1926—May	Stocks at end of 1925—May	Stocks at end of 1926—May	St'ks at end of Apr. 1926
Eastern Pa., N. J. & Md.	3,660,000	3,939,000	4,125,000	4,620,000	4,106,000	4,630,000	5,311,000
New York	838,000	861,000	907,000	928,000	1,164,000	1,418,000	*1,485,000
Ohio, Western Pa. & W. Va.	1,540,000	1,781,000	1,590,000	1,886,000	1,966,000	2,616,000	2,721,000
Michigan	1,120,000	1,289,000	1,201,000	1,301,000	1,245,000	1,920,000	1,932,000
Wis., Ill., Ind. & Ky.	2,400,000	†2,255,000	2,586,000	†2,618,000	3,218,000	†3,454,000	3,817,000
Va., Tenn., Ala. & Ga.	1,162,000	1,418,000	1,233,000	1,420,000	611,000	1,057,000	1,059,000
Eastern Mo., Iowa, Minn. & S. Dak.	1,552,000	1,518,000	1,714,000	1,777,000	3,067,000	2,819,000	3,078,000
Western Mo., Neb., Kans. & Okla.	1,130,000	1,116,000	1,169,000	1,130,000	1,558,000	1,429,000	1,443,000
Texas	392,000	454,000	429,000	447,000	258,000	508,000	501,000
California	1,067,000	1,229,000	1,130,000	1,252,000	473,000	529,000	552,000
Colorado & Utah	265,000		227,000		350,000		
Oregon, Wash. & Montana	377,000	†607,000	424,000	†571,000	424 000	†777,000	741,000
	15,503,000	†16,467,000	16,735,000	†17,950,000	18,440,000	†21,157,000	*22,640,000

*Revised. †Figures include estimate for one plant each in Indiana and Utah and are subject to revision.

IMPORTS OF HYDRAULIC CEMENT BY COUNTRIES AND BY DISTRICTS, IN APRIL, 1926

Imported from	District into which imported	Barrels	Value
Belgium	Florida	102,027	$154,400
	Massachusetts	28,101	42,804
	Mobile	11,879	18,106
	New Orleans	18,146	26,297
	Philadelphia	28,054	42,427
	San Francisco	24	36
	South Carolina	2,979	4,711
	Washington	11,975	15,879
	Total	203,185	$304,660
Denmark and Faroe Islands	Florida	20,666	$33,663
	Porto Rico	24,408	38,425
	Total	45,074	$72,088
United Kingdom	Los Angeles	2,222	$6,710
	Porto Rico	1,704	3,866
	Total	3,926	$10,576
Canada	Me. & N. H.	.....	$4
	St. Lawrence	2,276	5,288
	Total	2,276	$5,292
France	New York	1,751	$3,514
Greece	New York	.....	$5
Japan	Hawaii	1,060	$1,657
Sweden	New York	30	$322
	Grand total	257,302	$398,114

EXPORTS AND IMPORTS* EXPORTS OF HYDRAULIC CEMENT BY COUNTRIES, IN APRIL, 1926

Exported to—	Barrels	Value
Canada	1,927	$ 9,645
Central America	15,660	35,506
Cuba	9,466	24,254
Other West Indies	6,284	17,020
Mexico	10,330	30,563
South America	47,054	135,427
Other countries	5,575	32,357
	96,296	$284,772

DOMESTIC HYDRAULIC CEMENT SHIPPED TO ALASKA, HAWAII AND PORTO RICO IN APRIL, 1926*

	Barrels	Value
Alaska	2,639	$ 8,369
Hawaii	22,816	51,538
Porto Rico	7,535	19,212
	32,990	$79,119

*Compiled from the records of the Bureau of Foreign and Domestic Commerce and subject to revision. †Imports and exports in May, 1926, not available.

IMPORTS AND EXPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1925 AND 1926

Month	Imports 1925 Barrels	Imports 1925 Value	Imports 1926 Barrels	Imports 1926 Value	Exports 1925 Barrels	Exports 1925 Value	Exports 1926 Barrels	Exports 1926 Value
January	231,258	$ 364,196	360,580	$576,717	71,596	$ 207,547	72,939	$216,431
February	119,077	206,308	314,118	527,948	56,249	181,356	73,975	220,706
March	218,048	337,039	493,241	812,968	65,248	200,410	69,080	205,647
April	197,686	280,826	257,302	398,114	89,508	263,831	96,296	284,772
May	186,897	286,959	(†)	(†)	85,385	250,845	(†)	(†)
June	254,937	409,539	.....	.....	71,343	217,899	.....	.....
July	335,118	499,602	.....	.....	98,141	286,543	.....	.....
August	379,847	611,551	.....	.....	103,961	289,904	.....	.....
September	513,252	789,121	.....	.....	102,649	285,225	.....	.....
October	535,050	824,268	.....	.....	73,369	228,467	.....	.....
November	388,604	678,518	.....	.....	101,825	294,201	.....	.....
December	295,543	526,001	.....	.....	100,323	296,900	.....	.....
	3,655,317	$5,813,928	.....	.....	1,019,597	$3,003,128	.....	.....

Universal Portland to Increase Storage Capacity of Duluth Plant

CONSTRUCTION of nine new storage bins at the Duluth plant of the Universal Portland Cement Co. will be started in a short time, it was announced by Ray S. Huey, superintendent of the plant. The bins, to be of concrete, will cost about $100,000 and will increase the storage capacity to between 525,000 and 550,000 bbl. of cement.

Construction of the new bins was found necessary, according to Mr. Huey, because of the need for additional storage facilities during seasonal fluctuations in shipments from the Duluth plant. The additional bins, each to hold more than 10,000 bbl., will have a total capacity of about 100,000 bbl. The present capacity of the storage bins at the plant is about 450,000 bbl. The new bins, Mr. Huey said, will form a duplicate to the nine bins constructed two years ago.

The Bland Engineering Co. of Minneapolis will commence construction of the new bins as soon as excavation work, which has already been started, is completed. It is expected that the project will be completed during the summer.—*Duluth (Minn.) News-Tribune.*

South Dakota State Cement Plant Busy

THE weekly report of the South Dakota cement plant at Rapid City, made to Governor Carl Gunderson, covering the week ending June 5, shows that the plant has unfilled orders on hand amounting to 268,818 bbl. Production of the last week was slightly more than the shipments made. The plant made 15,200 bbl. and shipped 14,331 bbl. The total amount of cement on hand is 68,779 bbl. —*Sioux City (Iowa) Tribune.*

Alpha Plant at Martin's Creek Completes Year Without Accident

NO employe of the Alpha Portland Cement Co. plant at Martin's Creek, Penn., lost time through injury at the plant from May 26, 1925, to May 26 of this year, according to a recent announcement.

The number of man-hours completed without a lost time accident or permanent injury was 843,944. As a result of this safety record a bonus of $5 has been given to each employe.

Traffic and Transportation

EDWIN BROOKER, Consulting Transportation and Traffic Expert
Munsey Building, Washington, D. C.

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning June 21:

Southwestern Freight Bureau Docket

8644. **Lime**, from Sherwood, Tenn., to Delhi, La. To establish rate of 17½ cents per 100 lb. on lime, carloads, minimum weight 30,000 lb., from Sherwood, Tenn., to Delhi, La.

Sherwood, Tenn., is a local station on the Chattanooga Division of the N. C. & St. L. Ry., 56 miles west of Chattanooga, Tenn.

Interested shippers located at Sherwood, Tenn., have requested a through commodity rate on lime, carloads, from this point to Delhi, La., in line with the rate at present applicable from Knoxville, Tenn.

8677. **Limestone**, from points in Arkansas to points in Oklahoma. To amend Item 5636 of S. W. L. Tariff No. 15-M, applying from points in Arkansas to points in Oklahoma, to include ground limestone, carloads, minimum weight 80,000 lb. Item 5636 of S. W. L. Tariff No. 15-M is applicable on crushed stone and shippers request the application of the same rates on ground limestone.

8698. **Lime**, from Arkansas points to points in Oklahoma. To establish the following rates in cents per 100 lb. on lime, carloads, minimum weight 30,000 lb., from and to points shown below:

From Ruddells, Limedale Spur, Mercer and Johnsons, Ark., to Reams Mekko, North McAlester, Krebs, Buck, Dow, Richville, Carbon, Gaines, Adamson, Manning, Drumb, Chilli, Boiling, Patterson, Degnan, Wilburton and McAlester, Okla., 24.

In order to place the producing points named above on proper basis it is contended rates should be published on basis of 1½ cents per 100 lb. over the rate from Springfield, Mo., with the Johnsons, Ark., rate as a minimum.

8747. **Crushed stone**, from Stringtown, Okla., to Hollis, Okla. To establish a rate of 11 cents per 100 lb. on asphalt coated crushed stone, carloads, minimum weight 50,000 lb., from Stringtown, Okla., to Hollis, Okla.

The proposed rate, it is stated, is that in effect from Stringtown, Okla., to points in Texas for single line application, and is also the Oklahoma intrastate single line scale for 299 miles.

8723. **Lime**, from Missouri and Arkansas points to points in Kansas and Oklahoma. To establish the following rates in cents per 100 lb. on lime, carloads, minimum weight 30,000 lb., from and to points shown below:
(Santa Fe Stations)

To (Oklahoma)	From Mercer, Ark.	From Springfield, Mo.	From Ruddells, Ark., Limedale, Spur
Chilocco	26½	25	26½
Newkirk	26½	25	26½
Kildare	26½	25	26½
Ponca City	26½	25	26½
White Eagle	27½	26	27½
Bliss	27½	26	27½
Red Rock	27½	26	27½
Otoe	27½	26	27½
Black Bear	27½	26	27½
Arnettville	27½	26	27½
Perry....A. T. & S. F.	27½	26	27½
Frisco			
Asp	27½	26	27½
Orlando	27½	26	27½
Mulhall	27½	26	27½
Barnes	27½	26	27½
Lawrie	27½	26	27½
Eastern Oklahoma Jct.	27½	26	27½
Guthrie....A. T. & S. F.	27½	26	27½
Ft. S. & W.	27½		
South Guthrie	27½	26	27½
Seward	27½	26	27½
Waterloo	27½	26	27½
Edmond	27½	26	27½
Britton	27½	26	27½
Okla. City....A. T. & S. F.	27½	26	27½
M. K. T.			27½
Ft. S. & W.	27½		27½
Flynn	30	28½	30
Moore	30	28½	30
Norman	30	28½	30
Noble	30	28½	30
Walker	30	28½	30
Purcell	30	28½	30
Wayne	31	29½	31
Paoli	31	29½	31
Pauls Valley	31	29½	31
Gulf Junction	31	29½	31
Wynnewood	32½	31	32½
Kickapoo Sand Spur	32½	31	32½
Davis	32½	31	32½
Daugherty	32½	31	32½
Marston Spur	32½	31	32½
Crusher Spur	32½	31	32½
Berwyn	32½	31	32½
Ardmore....A. T. & S. F.	32½	31	32½
Downward Spur	34	32½	34
Overbrook	34	32½	34
Asphalt Spur	34	32½	34
Marietta	34	32½	34
Thackerville	34	32½	34
Sulphur....A. T. & S. F.	34		
Frisco			
Mervine	27½	26	27½
Uncas	27½	26	27½
Maramee	27½	26	27½
Quay	27½	26	27½
Yale	27½	26	27½
Norfolk	27½	26	27½
Cushing Jct.	27½	26	27½
Cushing....A. T. & S. F.	27½	26	27½
M. K. T.	27½		27½
Avery	27½	26	27½
Kendrick	27½	26	27½
Davenport	27½	26	27½
Sparks....A. T. & S. F.	27½	26	27½
Ft. S. & W.	27½		
Payson	27½	26	27½
Meeker	27½	26	27½
Aydelotte	27½	26	27½
Shawnee	27½	26	27½
South Shawnee	30	28½	30
Thackeray	30	28½	30
Tecumseh....A. T. & S. F.	30	28½	30
R. I.			
Macomb	30	28½	30
Tribbey	30	28½	30
Trousdale	30	28½	30
Wanette	30	28½	30
Byars	30	28½	
Russell	30	28½	30
Pleasant Valley	30	28½	30
Coyle	30	28½	30
Goodnight	30	28½	30
Perkins	30	28½	30
Cottingham	30	28½	30
Ripley	30	28½	30
Amabel	30	28½	30
Mehan	30	28½	30
Stillwater	30	28½	30
Yost	30	28½	30
Glencoe	30	28½	30
Navina	30	28½	30
Cashion	30	28½	30
Maysville	31	29½	31
Lindsay	31	29½	31
Willston	26½	25	26½
Braman	26½	25	26½
Sumpter	26½	25	26½
Blackwell....A. T. & S. F.	26½	25	26½
Frisco			
Tyner	27	25½	27
Tonkawa	29	27½	29
Manchester	30	28½	30
Gibbon	30	28½	30
Wakita	30	28½	30
Clyde	30	28½	30
Medford	29	27½	29
Numa	29	27½	29
Deer Creek	29	27½	29
Eagle	34	32½	34
Waynoka	34	32½	34
Heman	34	32½	34
Belva	34	32½	34
Quinlan	34	32½	34
Curtis	34	32½	34
Mooreland	34	32½	34
Alston	34	32½	34
Woodward	34	32½	34
Gerlach	34	32½	34
Tangier	34	32½	34
Fargo	34	32½	34
Gage	34	32½	34
Shattuck	34	32½	34
Goodwin	34	32½	34
Copan	22½	21	22½
Dewey....A. T. & S. F.	22½	21	22½
M. K. T.	22½		22½
Bartlesville....A. T. & S. F.	22½	21	22½
M. K. T.	22½		22½
Keba	22½	21	22½
Matoaka	22½	21	22½
Oshelata	22½	21	22½
Ramona	22½	21	22½
Vera	22½	21	22½
Collinsville	22½	21	22½
Owasso	22½	21	22½
Mohawk	22½	21	22½
Tulsa....A. T. & S. F.	22½	21	22½
Frisco			
Mudge	30	28½	30
Crescent	30	28½	30
Lovell	30	28½	30
Marshall	30	28½	30
Douglass	30	28½	30
Fairmont	30	28½	30
Enid	30	28½	30
Ituna	30	28½	30
Hillsdale	32½	31	32½
Nash	34	32½	34
Jet	34	32½	34
Cherokee	34	32½	34
Burlington	34	32½	34
Cornville	34	32½	34
Tabler	34	32½	34
Middlesburg	34	32½	34
Blanchard	34	32½	34
Washington	34	32½	34
Vincennes	34	32½	34
Rosedale	34	32½	34
Stratford	34	32½	34
Vanoss	34	32½	34
Kaw	27½	26	27½
Soldani	27½	26	27½
Apperson	27½	26	27½
Hickman	27½	26	27½
DeNoya Jct.	29	27½	29
DeNoya	29	27½	29
Naptha	29	27½	29
Burbank	27½	26	27½
Remington	27½	26	27½
Ralston	27½	26	27½
Jobes	27½	26	27½
Skedee	27½	26	27½
Esau Jct.	27½	26	27½
Cody	27½	26	27½
Camp (Crisco Crossing)	27½	26	27½
McKinley	34	32½	34
Brace	34	32½	34
Fair Valley	34	32½	34
Freedom	34	32½	34
Edith	34	32½	34
Salt Springs	34	32½	34
Lovedale	34	32½	34
Selman	34	32½	34
Buffalo	34	32½	34
Nardin	29	27½	29
Autwine	29	27½	29
Bodock	29	27½	29
Loder	32½	31	32½
Capron	32½	31	32½
Alva	32½	31	32½
Noel	34	32½	34
Avard	34	32½	34
Frisco	34	32½	34
Stonewall	34	32½	34
Tupelo	34	32½	34
Nixon	34	32½	34
Lehigh	34	32½	34

To (Oklahoma)	From—Mercer, Ark.	Springfield, Mo.	Ruddells, Ark., Limedale, Spur
Schlegel	31	29½	31
Pemeta	31	29½	31
Frey	31	29½	31
Oilton	31	29½	31
Player	31	29½	31
Ruska	31	29½	31
Jennings	31	29½	31
Drumright	31	29½	31
Libbey	....	35	36½
Sturgis	....	35	36½
Pritchett	....	36	36½
Keyes	....	35	36½
Ludham	....	36	37½
Boise City	....	36	37½
Harmer	....	36	37½
Felt	....	36	37½
(Kansas)			
Hamburg	....	31	32½
Garfield	....	31	32½
Nettleton	....	31	32½
Kinsley	....	31	32½
Ardell	....	31	32½
Offerle	....	31	32½
Bellefont	....	31	32½
Spearville	....	31	32½
Weight	....	31	32½
Beeson	....	31	32½
Dodge City	....	31	32½
Ensign	....	34½	36
Haggard	....	34½	36
Montezuma	....	34½	36
Copeland	....	34½	36
Sublette	....	34½	36
Satanta	....	34½	36
Ryus	....	34½	36
Hickok	....	34½	36
Ulysses	....	34½	36
Big Bow	....	34½	36
Johnson	....	34½	36
Manter	....	34½	36
Moscow	....	34½	36
Hugoton	....	34½	36
Feterita	....	34½	36
Rolla	....	34½	36
Wilburton	....	34½	36
Elkhart	....	34½	36

The proposed changes, it is stated, are to remove fourth section departures and also place Springfield, Mo., on the Mo. Pac. R. R. on a parity with rates in effect from the Ash Grove district of the St. L.-S. F. Ry. The proposed changes from Mercer, Ruddells and Limedale Spur, Ark., are to place these points on basis of 1½ cents per 100 lb. higher than in effect from the Springfield district.

New England Freight Association Docket

10307. **Stone**, broken or crushed, and articles taking same rates in N. Y. N. H. & H. R. R. I. C. C. F2505, in bulk, in gondola or other open cars, minimum weight 90% marked capacity of car, from Branford (Pine Orchard Quarry), East Wallingford (Reeds Gap Quarry), and Rocky Hill, Conn., $1.10 per ton of 2000 lb. Reason—Equalization of competitive conditions.

10321. **Limestone** crude, crushed or ground, minimum weight 50,000 lb., from Brandon and Middlebury, Vt., to Toronto, Ont., 24½, via Rouses Point, N. Y., and Canadian National Rys. Reason—Rate comparable with rates to other points of similar distances.

10325. **Limestone**, ground unburnt or broken, minimum weight 50,000 lb., from Winooski, Vt., to local stations of C. V. Ry. on same basis as currently applicable locally on B. & M. R. R. in their I. C. C. A2565.

10334. **Sand**, minimum weight 60,000 lb., except when capacity of the car is less, actual capacity of car should govern, but in no case shall minimum carload weight be less than 40,000 lb., from East Swanton, Vt., to Noyan Junction, Que., 95 cents per ton of 2000 lb. via Swanton, Vt., Canadian National Rys. Reason—Necessary to be on same basis as rates to St. Lambert and Grand Ligne, Que.

10345. **Ground feldspar** from Bates, Littlefield, Lockes Mills and South Paris, Me., to Schenectady, N. Y., 22½, via Rouses Point, N. Y., and Delaware & Hudson Co. Reason — Rate already in effect to more distant points west of Schenectady, such as Buffalo, N. Y., Rochester, N. Y., and Philadelphia, Pa.

10357. **Talc**, minimum weight 40,000 lb., to Oaks, Pa., from Waterbury, Middlesex, Braintree, East Granville, Bethel, Vt., 29 cents; from Rochester and Stockbridge, Vt., 30½ cents. Reason: To be on same basis as Philadelphia in C. V. Ry. I. C. C. A5922.

10382. **Sand**, blasting, core, fire and sea, minimum weight 90% marked capacity of car from and to N. Y. N. H. & H. R. R. stations named in Item 670A of N. Y. N. H. & H. R. R. I. C. C. F2796, specific rates based on 55% of sixth class rates. Reason—To provide a uniform basis of rates between stations where there is a known movement of traffic.

10385. **Dolomite** or fluxing stone, minimum weight 90% of marked capacity of car from Lee, West Stockbridge, Ashley Falls, Mass., Canaan, New Milford, Danbury, Conn., etc., to N. Y. N. H. & H. R. R. and C. N. E. Ry. stations, mileage rates in cents per 2000 lb., viz.: 1 to 20 miles, $1.00; 21 to 30 miles, $1.05, etc. (Basis of aproximately 115% of traprock rates.) Reason—To provide a uniform basis of commodity rates for movement of this low grade commodity.

Central Freight Association Docket

13434. **Crushed stone**, carloads, Carey, O., to Painesville, Geneva and Conneaut, O. Present rate, 6th class; proposed, $1.10 to Painesville, O.; $1.25 to Geneva, O., and $1.35 per net ton to Conneaut, O.

13435. **Sand and gravel**, carloads, Columbus, O., to Mansfield, Alta, Lexington, Belleville, Lockhart, Gatton Rock, Butler and Ankenytown, O. Present rate, $1 per net ton; proposed, 90 cents per net ton.

13436. **Sand and gravel**, carloads, Terre Haute, Ind., to Riley, Ind. (E. I. & T. H. Ry.). Present rate, 66 cents per net ton; proposed rate, 60 cents per net ton.

13439. **Sand and gravel**, carloads:

From	Present	Proposed
Gravel Pit, O., to Spring Valley, O.	$1.50	$0.85
Gravel Pit, O., to Hamilton O.	1.20	.75
Sargents, O., to Frankfort, O.	1.30	.80
Sargents, O., to Ritteours, O.	1.30	.80

13440. **Lime**, common, hydrated, quick or slacked, carloads, minimum weight as per Official Classification, Kenova, W. Va., to Kane, Johnsonburg and Ridgway, Pa. Present, 22½ cents per Item 2782 of C. F. A. T. B. Tariff 218C, I. C. C. 1644. Proposed, 19 cents.

13443. **Crushed stone**, carloads, Greencastle, Ind., to points in Illinois.

To Wabash Ry. Stations.	Present Rates*	Proposed Rates
Tilton	$2.20	$1.26
Catlin	2.20	1.26
Fairmount	2.20	1.26
Homer	2.20	1.26
Sidney	2.30	1.26
Philo	2.30	1.26
Tolono	2.40	1.26
Sadorus	1.80	1.26
Ivesdale	1.80	1.26
Bement	1.50	1.26
Milmine	1.90	1.26
Cerro Gordo	1.90	1.26
Oakley	1.90	1.26
Decatur	1.90	1.26
Vorhies	2.40	1.26
Hammond	2.40	1.26
Lovington	2.40	1.26
Cushman	2.20	1.26
Sullivan	2.20	1.26
Bruce	2.20	1.26
Strasburg	2.20	1.26
Herborn	2.20	1.26
Stewardson	2.20	1.26
Shumway	2.40	1.26
Blue Point	2.40	1.26
Altamont	2.40	1.26

*Represents combination of commodity rate to Danville or Windsor, Ill., plus Class "E" beyond.

13448. **Crushed stone**, crushed stone screenings and tailings (other than ground or pulverized agricultural limestone, ground or pulverized limestone, fluxing stone or raw dolomite, fire stone and silica rock or silica stone), carloads, Waterville, O., to Milford, Mich. Present rates, $1.61 per net ton; proposed, $1.38 cents per net ton, to apply via N. Y. C. & St. L. Ry. (C. L. district), Toledo, O., and Pere Marquette Ry.

13449. To establish on **sand, gravel** and **crushed** stone, carloads, following rates:

Sand and gravel from Germantown, O.; crushed stone from Lewisburg, O., to N. & W. Ry. stations, proposed, per net ton:

Mariemont, O.	$0.90	Williamsburg, O.	$1.00
Clara, O.	.90	Eastwood, O.	1.05
Newtown, O.	.95	Mt. Oreb, O.	1.05
Perintown, O.	.95	Sardinia, O.	1.05
Gernon, O.	1.00	Seaman, O.	1.15
Batavia, O.	1.00	Lawshe, O.	1.15
Afton, O.	1.00		

Present rates, as per C. C. C. & St. L. Ry. Tariff 1906A, Ohio 2565.

13450. **Core sand**, carloads, Smith's Crossing, Mich., to Flint, Detroit, Lansing and Muskegon, Mich. Present rates, as published in P. M. Ry. Tariff I. C. C. 4630; proposed, 88 cents to Flint, $1.13 to Detroit, $1.26 to Lansing and $1.39 per net ton to Muskegon, Mich.

13452. **Sand and gravel**, carloads, Anderson, Ind., to Portland, Ind. Proposed rate, 6th class rate of 13 cents; proposed, 85 cents per net ton, via C. C. C. & St. L. and N. Y. C. & St. L. R. R. (L. E. & W. district).

13454. **Sand** (other than blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding or silica) and **gravel**, carloads, siding of the East Liverpool Sand Co., east of Leetonia, O., to Wheatland, Farrell, Sharon and Sharpsville, Penn. Present rates, $1.05 per ton; proposed, 90 cents per ton.

13463. To amend Southern Ry. Co. St. Louis-Louisville divisions, St. Louis division Tariff No. 1184F, I. C. C. No. 2075, by publishing therein rate of 70 cents per net ton on crushed stone, screenings and agricultural limestone (not reground) in bulk, carloads, from Milltown and Marengo, Ind., to Louisville, Ky., in lieu of rate of 80 cents per net ton now in effect.

13465. **Sand and gravel**, carloads, South Heights, Pa., to Woodlawn, Pa. Present rate, 70 cents per 2000 lb.; proposed, 60 cents per ton.

13471. **Lime**, common, hydrated, quick or slackced, carloads, minimum weight as per Official Classification, Marble Cliff, Ohio, to Judyville, Ind., and Alvin and Hoopeston, Ill. Present rate, 22 cents; proposed, 17½ cents.

13478. **Sand and gravel**, carloads, Terre Haute, Ind., to Beardstown, Ill. Present rate, 6th class; proposed, $1.26 per net ton.

13479. **Crushed stone**, carloads, from Marion, Ohio (in cents per net ton). To—

N. Y. C. R. R. (O. C. L.)
Stations in Ohio:

	Present	Proposed		Present	Proposed
Climax	100	80	Centerburg	100	80
Edison	100	80	Croton	100	86
Mt. Gilead	100	80	Johnstown	100	85
Fulton	100	80	Alexandria	100	90
Marengo	100	80	Granville	100	90
Bennington	100	80	Heath	100	95
Peerless	100	80	Hebron	100	95
Rich Hill	100	80			

Present—As indicated above, representing the rate currently in effect to Millersport, Ohio, applied under intermediate application.
Authority C. C. C. & St. L. Ry. Tariff 1906A.

13482. **Lime**, carloads, minimum weight 30,000 lb., Hannibal, Mo., Marblehead and Quincy, Ill., to Terre Haute, Ind.

	Present	Proposed Local	Proposed Prop'l.
From Hannibal, Mo., to Terre Haute, Ind.	$0.16	$0.15	.....
From Marblehead, Ill., to Terre Haute, Ind.	.16	.15	$0.14
From Quincy, Ill., to Terre Haute, Ind.	.16	.15	.14

13506. **Crushed stone and screenings**, carloads, Wampum and Crescentdale, Pa., to various points in Pennsylvania. Present and proposed rates:

To	From—Wampum, Pa., Crescentdale, Pa. (2) Proposed Rate	P. E. L. E. R. R. (3) Present Rate
Penowa, Pa.	$1.15	$1.05
Avella, Pa.	1.15	1.05
Rea, Pa.	1.15	1.05
Woodrow, Pa.	1.15	1.05
Hickory, Pa.	1.15	1.05
Acheson, Pa.	1.15	1.05
Venice, Pa.	1.15	1.05
Bridgeville, Pa.	1.15	1.05

(2)—Per 2000 lb.
(3)—Rates per 2000 lb. per P. & L. E. R. R. Tariff I. C. C. 2760.

Illinois Freight Association Docket

3713. **Lime**, carloads, from Mosher and Ste. Genevieve, Mo., to stations on the N. Y. C. & St. L. R. R. in Illinois.
Present (to representative points), Humrick, Ill., Stewardson, Ill., Mode, Ill., 21 cents; proposed (representative points), Humrick, Ill., Stewardson, Ill., 15½ cents; Mode, Ill., 13½ cents.

Southern Freight Association Docket

27407. **Sand** from Sawyers Mill and Lipe, Tenn., to Birmingham, Ala., Group points. It is proposed to extend the rate of $1.80 per net ton on sand, carloads, minimum weight 60,000 lb., from Sawyers Mill and Lipe, Tenn., to Birmingham and Bessemer, Ala., to be also applicable to points generally included in the Birmingham Group, viz.: Boyles, Ensley, East Birmingham, North Birmingham, McAdory and Dolcito Junction, Ala.

27424. **Crushed stone** from Madisonville, Corulean and Cedar Bluff, Ky., to Illinois points. No through rate in effect. Proposed rates on crushed stone, as described in I. C. R. R. I. C. C. 6901, from origins named: To Mound City, Carbondale, Christopher, Johnson City, Carterville and Reesville, Ill., $1.13 per net ton; to Golconda, Ill., $1.25 per net ton; to Stewart Mine and Bakers Mine, Ill., $1.39 per net ton. The proposed rates are made in line with rates in effect to Marion, Parker, Christopher and Benton, Ill.

27438. **Sand and gravel** from Kenneth, S. C., to Jacksonville, Fla. Present rates, $2.70 per net ton; proposed rates on sand and gravel, carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity actual weight will govern, from Kenneth, S. C., to Jacksonville, Fla., proper, $1.94; for beyond, $1.97 per net ton, the last named rate to be subject to Agent Jones' Combination Rules Tariff, I. C. C., US-1. The "proper" rate is based on the proposed Alabama-Georgia scale for

single line application over trunk lines, less 10%. The "for beyond" rate is based 3 cents over the "proper" rate, and is made subject to the Combination Rules Tariff.

27504. **Sand and gravel** from Petersburg, Va., to Carson, Va. In lieu of present rate of 61.2 cents per net ton, it is proposed to establish on sand and gravel, carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity, actual weight will govern, from and to points named, rate of 54 cents per net ton (intrastate), based on the proposed Alabama-Georgia scale (single line), for application over trunk lines, less 10%.

27371. **Sand,** from Prattville Junction, Ala., to Brownson, Ala. In lieu of combination rate of 97 cents per net ton, it is proposed to establish on sand, carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their full visible capacity, actual weight will govern, from and to points named, rate of 79 cents per 100 lb., same as rate in effect to Sylacauga, Ala.

27379. **Crushed stone and agricultural limestone** from Illinois and Kentucky points to Mississippi valley points. It is proposed to publish revised rates on crushed stone and agricultural limestone, carloads, from Krause, Anna, Stolle, Ill., Cerulean, Madisonville and Cedar Bluff, Ky., to I. C. R. R., Y. & M. V. R. R. and G. & S. I. R. R. stations. Statement showing present and proposed rates, with basis for proposed rates, will be furnished upon request.

27574. **Sand** from Hurricane, Ga., to Yulee, Lofton, O'Neil, Fernandina and Jacksonville, Fla. In lieu of combination rates, it is proposed to establish the following rates on sand, carloads, minimum weight 90% of marked capacity of car, except that where cars are loaded to visible capacity, actual weight will govern, from Hurricane, Ga., to Yulee, Fla., $1.31; to the other destinations named, $1.35 per net ton, based on the proposed Georgia-Alabama joint line scale, less 10%, except that to Fernandina, the proposed rate is based on 110 miles.

27581. **Limestone,** etc., from Mascot, Tenn., to St. Louis, Mo. Present rate, $2.52 per net ton. Proposed rate on limestone, marble or marl, ground or pulverized, and phospho-plaster, carloads, minmum weight 88,000 lb., from Mascot, Ten., to St. Louis, Mo. (when for St. Louis Terminal Railroad Association deliveries only), $2.35 per net ton, made on basis of Southern Ry. single line mileage (I. C. C. A-9956), to East St. Louis, Ill., plus 10 cents per ton.

27583. **Lime** from Denie, Ala., to all points to which rates are published in Agent Glenn's Lime Tariff, I. C. C. A-380. No through rates now in effect. Proposed rates on lime, common, hydrated, quick or slacked, in bulk or in packages as provided for carload shipments in Consolidated Classification, carloads, minimum weight 30,000 lb., from and to points named above, same as now in effect from Shisca, Ala., published in tariff mentioned.

27590. **Stone,** marble or slate, crushed or broken, from Whitestone and Tate, Ga., to Memphis, Tenn. (for beyond). Present rate, $2.93 per net ton. Proposed rate on stone, marble and slate, viz.: Stone, marble or slate, broken or crushed, carloads, subject to present carload minimum weight, $2.50 per net ton, made in line with rates in effect from other Georgia producing points.

27637. **Gravel** from Montgomery, Ala., to Campbellton, Fla. In lieu of present rate of $3.70 per net ton, it is proposed to establish rate of $1.74 per net ton on gravel, carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity actual weight will govern, from and to points mentioned, made on basis of the scale, less 10%, for application over trunk and short lines submitted by carriers to the Georgia and Alabama commissions.

27644. **Limestone,** from Whitestone, Ga., to Tuskogee, Ala. Present rate, $3.33 per net ton. (combination) Proposed, $2.21 per net ton on limestone, whitestone or marble, ground, powdered or pulverized, carloads, minimum weight 60,000 lb., from Whitestone, Ga., to Tuskogee, Ala., based on the proposed Georgia-Alabama scale, for trunk and short line application, less 10%.

Western Trunk Line Docket

5205A. **Stone, broken,** crushed or ground, carloads, from Sharp, Mo., to Leavenworth, Kan. Present, $1.42; proposed, 85 cents per ton. Minimum weight. marked capacity of car, but not less than 50,000 lb.

2051U. **Stone, crushed,** carloads, from Jasper, Quartzite and Pipestone, Minn., and Sioux Falls, S. D., to Oelwein, Ia. Present, Class E rates; proposed, 9½ cents per 100 lb. Minimum weight, 90% of marked capacity of car, except when loaded to full visible capacity and weight is less than 90% of marked capacity, the actual weight to apply, but not less than 50,000 lb. (By shipper.)

5496. **Lime,** carloads, from Manistique and Marblehead Spur, Mich., to stations in Illinois, Indiana, Missouri, Wisconsin and Iowa as set forth in M. St. P. & S. S. M. Tariff G. F. D. 32560, I. C. C. 5929. Present, no through rate published; proposed, 3½ cents higher than the rate in effect from Oshkosh, Wis. Minimum weight 40,000 lb.

5502. **Stone,** crushed, carloads, from Gallatin, Mo., to Iowa points, of which the following are representative:

Present—To Hartford, Paris, $2.10; Chariton, $1.80; Allerton, $1.60. Proposed — To Hartford, Chariton, Paris, Allerton, $1.40.

Minimum weight 90% of marked capacity of car, except that when weight of shipment loaded to full visible capacity of car is less than 90% of marked capacity of car, the actual weight will apply; but in no case shall the minimum carload weight be less than 40,000 lb. (By shipper.)

Trunk Line Association Docket

13404. **Limestone,** viz., crude fluxing, foundry and/or furnace, carloads, from points of origin shown on page 524 of Agent Wilson's Tariff I. C. C. A157 taking Rate Bases A, B, C and D; and Williamson, Pa., to Detroit, Mich. From Rate Bases—A, $2.90; B, $3; C, $3.10; D, $3.20, and Williamson, Pa., $3 per gross ton. Reason—Proposed rates compare favorably with rates from the same origin points to other destination points in C. F. A. territory. File 40329.

13415. **Crushed stone,** slag, blast, furnace, crushed in bulk, sand and gravel, carloads, from and to New York points as shown below:

To—	From—		
Buffalo & Susquehanna R. R. (N. Y. stations)	Attica, N. Y.	*East Buffalo, N. Y.	†LeRoy, N. Y.
Fords Brook	.....	$1.50	$1.50
Mapes	$1.50	1.50	1.50
Shongo	1.50	1.50	1.50
N. Y. & Pa. Ry.			
Bennetts	.....	1.50	.....
Greenwood	1.50	1.50	1.50
Rexville	1.50	1.50	1.50
Barney Mills	.....	1.50	.....
McGraws	1.50	1.50	1.50
Whitesville	1.50	1.50	1.50
Culver	1.50	1.50	1.50
Paynesville	1.50	1.50	1.50

*East Buffalo, Buffalo (Louisiana St.), Buffalo Lake, Buffalo (Walden Ave.), Buffalo (Main St.). Black Rock.

†LeRoy and Stafford.

Rates per 2000 lb.

Reason—To keep the various shipping points and road-building commodities on a comparable basis to the territory in question. File 39850.

13416. To increase rate of 55 cents to 65 cents per 2000 lb. on gravel, carloads, from Solsville to Utica, N. Y. Reason—To place the rate on gravel on a comparable basis with rates on crushed stone. File 40353.

13444. To cancel rate of 17½ cents per 100 lb. on **lime,** carloads, minimum weight per O. C., from Akron and Oakfield, N. Y., to Berwick, Pa., leaving no through rate in effect. Classification basis to apply. Reason—Investigation develops that no traffic has been moving and there are no prospects of future movements, therefore rate is obsolete. File 40443.

13447. To cancel from P. R. R. Tariff G. O., I. C. C. No. 14440, page 32, rates on **oyster shell lime,** carloads, as follows:

From	Rate
Baltimore, Md., stations to McConnellstown, Pa.	12½c per cwt.
Sutton to Sparrows Point, Md., to Mt. Dallas, Pa.	16c cwt.

Reason—Oyster shell lime is nothing more or less than agricultural lime, and rate of 12 cents per 100 lb. is published between the above named points on the latter commodity. The oyster shell lime rates are not being used, therefore same are obsolete. File 40479.

13367. **Oyster shell lime,** carloads, minimum weight 30,000 lb., from Cambridge, Md., to P. R. R. points, rates changing from $2.80 to $4.20 per ton of 2000 lb. Reason—To place Cambridge on the same basis as Crisfield, Md. File 39891.

13474. (a) **Gravel and sand,** other than blast, engine, foundry, glass, moulding or silica, carloads. (b) **Sand,** blast, engine, foundry, glass, moulding or silica, carloads, from Dunbar, Pa., to Connellsville, West Side, Pa.: (a) 45 cents, (b) 50 cents per 100 lb. Rates to apply only on traffic destined to points on the W. Md. and P. L. E. where no through rates are in effect. Reason—To correct tariff error and reinstate restriction which was inadvertently omitted when rates were originally published. File 40601.

M645. To revise the rates on **gravel,** carloads, from and to stations as shown below:

From	To Utica Pres.	To Utica Prop.	So. Utica Pres.	So. Utica Prop.
Solsville	$0.55	$0.65	.....	.....
Boonville	.65	.75	$0.65	$0.75
Alder Creek	.65	.75	.65	.75
Prospect Juct.	.65	.75	.91	.75
Forestport	.65	.75	.65	.75
Nichols Mills	.65	.75	.65	.75

(Above rates per 2000 lb.)

It is also proposed that the rate on sand from Prospect Jct. to South Utica be reduced from 91 to 65 cents per 2000 lb., thereby placing rates to South Utica on same basis as Utica.

Adjust Rates on Lime to Central Territory

THE Interstate Commerce Commission, in No. 16170, Eastern Lime Manufacturers' Traffic Bureau et al. vs. Akron and Barberton Belt et al., opinion No. 11233 (112 I. C. C. 7-28), has prescribed a rate adjustment on lime from producing points in Maryland, Pennsylvania, West Virginia, Virginia and Ohio to destinations in Central Territory to be made effective not later than August 20. Existing rates were found unreasonable and findings in Lehigh Lime Co. vs. Akron, Canton and Youngstown (85 I. C. C. 341), and lime from Eastern Trunk Line points (93 I. C. C. 617), were modified in part. The new adjustment is to be on an origin group basis and is to apply on lime, except agricultural and fluxing lime, on a minimum of 30,000 lb. The destination territory is in the 60 and 67% groups. From Group 1 the rate to Pittsburgh is to be 13.5 cents and to Youngstown, Steubenville and Wheeling group is to be 15 cents.

Restore Old Rates on Gypsum Products from California to Utah

ACCORDING to Charles A. Bland, industrial department manager of the Long Beach (Calif.) Chamber of Commerce, the Interstate Commerce Commission has ruled against the increased rates levied January 1 on gypsum, plaster board, wall plaster, stucco blocks and other by-products from Los Angeles and the harbor district into Utah.

The old schedule of 32.5 cents was increased on January 1 to 49.5. As a result of the protests this invoked, the commission, in a February hearing, suspended the new rates until May 27 pending final decision and has now given the roads until June 26 to restore the old rate.—*Long Beach (Calif.) Press-Telegraph.*

Railroads Must Not Discriminate in Conditioning Cars

A RECENT Interstate Commerce Commission decision given in a grain case may have a bearing on the rock products industries. The report is from No. 17222, Omaha Grain Exchange vs. Chicago, Burlington and Quincy et al., Examiner J. F. Eschelman, and the interesting paragraph says: "With respect to sweeping, padding and weather stripping cars, otherwise suitable for loading, the defendants should accord shippers at Omaha the same services as they contemporaneously accord to competing millers in Kansas City."

It was reported that an order requiring equality of treatment in the fitness of cars furnished should be entered.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Mississippi Products Plant Specializes on Concrete Culverts

Nelsen Concrete Culvert Co., Hattiesburg Miss., Has Its Own Patented Design

THE Nelsen Concrete Culvert Co. has a plant at Hattiesburg, Miss., which specializes in the manufacture of concrete culverts. The plant production is sold for use in both railway and highway construction.

The main product is the Nelsen culvert, which is a patented form. This culvert is in the form of a half round arch with extended sides. Reinforcing rods are cast in to go across the bottom, as shown in the picture. When the culvert sections are set in place these rods are covered with the concrete which forms the base on which the sections are set. Thus the finished culvert is reinforced all around and will resist earth pressure from above or bursting pressure from a heavy flow of water through it. The shape of the culvert is said to be designed so that the flow will give the least friction when the culvert is running full. In effect it has the carrying capacity of a square box culvert, coupled with the supporting strength of an arch top. When completed it is practically monolithic. These sections are more easily transported and handled on the job than pipe of equal capacity.

In addition the company makes large concrete pipe up to 60 in. in diameter. These are used for culverts by the railroads and are made to conform to the standards of the railroad to which they are sold. Hattiesburg is an important southern railroad center and is on several lines. The same class of pipe is also used for highway culverts when demanded, though Mississippi is not as progressive in road building as some of the other states.

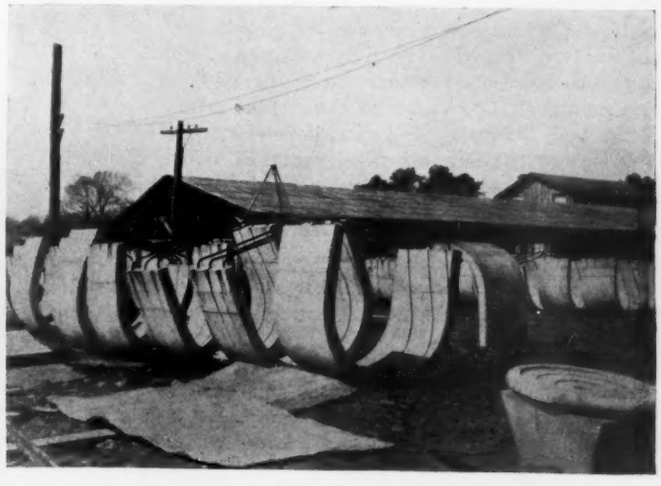
In connection with the culvert work end pieces with wings are made. These are used at the ends of culverts where they go through the embankment. Sometimes these are used at both ends of the culvert and sometimes only at the up-stream end.

All the product of the plant is made by tamping concrete from a machine mixer into steel molds in which the reinforcing has been placed. The usual practice in culvert pipe making is followed throughout. Owing to the mild climate the work may be carried on in open sheds throughout the year. Curing is by sprinkling after the forms are stripped from the product. Negro labor is used, and is paid on a basis of making a certain number of pieces of each size as a day's work.

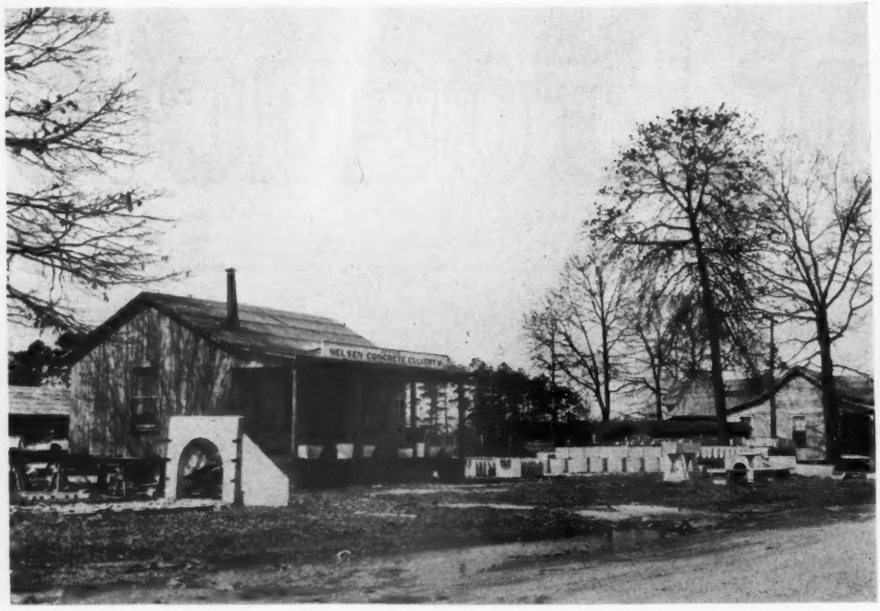
The aggregate used is sand and pea gravel, which is bought from the regular producers in Hattiesburg. The plant is near two of the important sand and gravel deposits and in fact the land on which it stands contains sand and gravel. But it has been found cheaper to buy the aggregate from a regular producer than to attempt to produce it in the quantity that would be needed for making concrete products.

The plant makes some garden furniture and trimstone and an increasingly important part of its production is in concrete fence posts. These are of the simple square form and since they were well introduced the sales have been regular. They are used in many places where their

Concrete culvert pipe of 60-in. diameter



Special culvert sections made by this company



Plant of Nelsen Concrete Culvert Co., near Hattiesburg, Miss.

better appearance causes them to be preferred to wooden posts, as around parks and cemeteries.

The manager of the plant is F. L. Miller. He and his associates came from Illinois a few years ago and have built the business from the ground up. The wonderful advance which the Gulf Coast country is making ought to insure a continually growing market for its products

Manhole and Catch Basin Block Find Growing Market

MORE than 3,000,000 concrete manhole and catch basin block were manufactured and used in Chicago and its suburbs during 1925. If this statement is surprising, let it be said that the market requirements are several times that many, and with additional facilities in present factories and a new factory going into production, the 1926 output should be between 4,000,000 and 5,000,000 in the vicinity of Chicago alone.

While varying quantities of these block are being manufactured and marketed in perhaps a dozen more cities, and the product has been successful wherever well made, few cement products manufacturers have realized the possibilities for profits in these block, and hundreds of contractors who would gladly use them are still ignorant of their merits. Engineers and contractors who have had experience with concrete manhole and cistern block, after an opportunity to compare them with brick, invariably favor the former material because of labor saved in laying and speed with which construction is completed.

Concrete manhole and catch basin block are solid circumferential units, usually 16 in. in mean length and 4, 6 and 8 in. in height. For catch basin purposes these block are made 4 in. thick and for manholes 5 and 6 in. thick. Curvature is made so that the block may be used in circles of from 30 in. to 42 in. diameter, ordinarily. In certain cases this range is from 36 in. to 48 in. diameter. Each block is tongue-and-grooved on bottom, top and ends, and while made to exact curvature for the above diameters, satisfactory results will follow the use of one more or one less block per course in order to increase or reduce the diameter where desired.

These block are customarily laid in 1:3 cement and sand mortar with full, flush joints, and where heads of water are encountered they are sometimes given a thin coat of cement plaster outside or inside, or occasionally both outside and inside. The latter construction may be relied on to successfully cope with any water pressure ordinarily found in city areas. The same method is commonly employed when the block are used to build a circular cistern.

So important is the matter of quality in the successful use of these block that a number of sanitary engineers recently prevailed on the Portland Cement Association to provide a working specification, there being nothing of the kind in use or under consideration in the American Concrete Institute or the American Society for Testing Materials at the present time. As a result, the following temporary specification recently has been offered by the cement association and the subject of permanent specification taken up with the American Concrete Institute and assignment made to its Committee P-1, which has jurisdiction over such matters.

Provisional Specifications

1. The purpose of these specifications is to define the requirements for solid concrete manhole and catch basin block.

2. The word "concrete" shall be understood to mean portland cement concrete.

Strength Requirements

3. The ultimate compressive strength of solid concrete manhole and catch basin block at 28 days of age or when delivered upon construction work must average not less than 1500 lb. per square inch of cross-sectional area of the unit as laid in the wall. No individual unit shall test less than 1200 lb. per square inch of cross-sectional area under the same conditions.

Absorption Requirements

4. Concrete manhole and catch basin block shall not absorb more than 8% of the dry weight of the unit when tested as hereinafter specified.

Sampling

5. Specimens for tests shall be representative of the commercial product of the plant. Not less than three and preferably five specimens shall be required for each test.

6. Specimens used in the absorption test may be used for the strength test.

Absorption Test

7. The specimens shall be immersed in clean water at approximately 70 deg. F. for a period of 24 hr. They shall then be removed, the surface water wiped off, and the specimens weighed. Specimens shall be dried to a constant weight at a temperature of from 212 to 250 deg. F. and reweighed. Absorption is the difference in weight divided by the weight of the dry specimens and multiplied by 100.

Strength Test

8. Specimens for the strength test shall be dried to constant weight at a temperature of from 212 to 250 deg. F.

9. The specimens to be tested shall be carefully measured for overall dimensions of length, width and height.

10. Bearing surfaces shall be made plane by capping with the plaster of paris or a mixture of portland cement and plaster which shall be allowed to thoroughly harden (from 3 to 6 hr.) before the test. No point on the surface shall deviate from the plane more than .003 in. The cap shall not be thicker than ⅛ in. and shall be formed by means of a cast iron or steel plate which has been machined to a true surface.

11. Specimens shall be accurately centered in the testing machine.

12. The load shall be applied through a spherical bearing block placed on top of the specimen. The rate of loading after 50% of the ultimate load has been applied shall be not greater than that which will produce a shortening of the specimen of .02 in. per minute.

13. When testing other than rectangular block or tile, care must be taken to see that the load is applied through the center of gravity of the specimen.

14. Machined steel or cast iron plates of sufficient thickness to prevent appreciable bending shall be placed between the spherical bearing block and the specimen. In no case shall the distance between the edge of the spherical bearing block and the end of the

bearing plate be greater than twice the thickness of the plate. Where a number of thin plates are used, in no case shall the plates be less than 1 in. thick, nor shall any plate extend beyond the one immediately above it a greater distance than twice the thickness of the plate.

15. The specimen shall be loaded to failure.

16. The compressive strength in pounds per square inch of gross cross-sectional area is the total applied load in pounds divided by the cross-sectional area in square inches.

Markets for This Block Are Numerous

These block are economical and especially convenient for all kinds of manhole work, including street sewers, catch basins for house connections serving residences, apartments and other kinds of buildings; manholes to house shut-off valves, meters and other appurtenances of water and gas systems; similar use for telephone and electric lines carried in underground conduits; for underground railroad and other subway work; as battery containers on railroads; for cisterns wherever it is desired to store moderate quantities of water.

With this large variety of uses, there undoubtedly is an opportunity to sell these circumferential block in profitable quantities in many cities of 25,000 or more. Construction with these block is invariably better than of brick, while the wide adaptability of the block to a variety of desired sizes and freedom from form expense give it advantages over monolithic concrete construction.

Another Kind of Block Machine

ATTENTION of the editors has been called to an erroneous statement made in the issue of Rock Products for May 1 in an article on the work being done at the plant of George M. Formby, Jacksonville, Fla. The article had particular reference to the use of a curing compound in concrete blocks, but some incidental facts regarding the plant were added, in which the block machine was credited to the wrong manufacturer. This is an "Ideal" machine, made by the Ideal Concrete Machinery Co. of Cincinnati, Ohio, and doubtless the many users of that machine recognized it in the illustration and caught the error in the article. We are advised that Mr. Formby has used nothing but Ideal machinery for the past 10 years.

The illustration of the machine is repeated herewith for proper identification. The entire article of May is worth reading again.

Big Cinder Block Corporation Formed

FOLLOWING announcement that steel shapes are now being stocked in warehouses for run-of-the-market call for those desiring to use steel for dwelling house framing comes the formation of a $2,500,000 company to manufacture all kinds of fire resistive building materials out of cinder ashes and cement, thus making it possible for construction of all kinds to be carried on with the use of the cheapest known raw materials and, according to competent engineering authorities, to provide at low cost finished structures that will pass the tests of the most exacting fire insurance companies.

Charles R. Flint & Co., Inc., in association with George L. Benbow announced recently the consummation of negotiations with 76 of the cinder tile manufacturing plants throughout the country out of which 31 of the best equipped factories located at strategic points from New York City to Denver and from Flint, Mich., to Richmond, Va., have formed the National Concrete Products Corporation, with headquarters in Philadelphia for the manufacture and national distribution in tremendous quantities of cinder-concrete common brick, hollow fireproofing tile, building block, flooring and roofing tile, plain and ornamental facade material and partition tile.

In effecting this consolidation the financial interests, Charles R. Flint & Co., Inc., of New York and Rufus Waples & Co. of Philadelphia, saw to it that waste resulting from the rivalry existing heretofore between the licensees manufacturing cinder-cement products under the Sigurd Bo and Straus patents, controlled by the Building Units Patents Corporation, was eliminated. Accordingly the National Concrete Products Corporation has acquired all of the outstanding stock of the Building Units Patents Corporation, and, in addition, has gathered in all of the Warner machine patents by which provision is immediately made for the saving of hundreds of thousands of dollars annually by the plants in the combine in the manufacture of cinder-cement products.

The manufacture of cinder-cement building material, according to Mr. Flint, involves the use of 1,000,000 tons of cinder-ash a year. The supply of this raw material is spotty, large quantities being available in some locations and smaller volumes in others. By means of advantageously locating plants where supplies of cinders can be had without interruption and at the same time give a great territorial spread for distribution of finished products, markets are being easily created for building materials that have low cost advantages in the matter of obtaining raw materials, in manufacture and as finished commodities.—*Dow Daily Building Reports.*

Block making at plant of George M. Formby, Jacksonville, Fla.

Cement Products Company Erects New Plant

THE Cement Products Co., Birmingham, Ala., has just erected a new sheet metal building, 35x100 ft., equipped with overhead carrier system, in which the manufacture of the Norwalk burial vault will be carried on.

The additional space now available in other buildings will be used for storage, showroom extension and for making other cement products.

The company has recently changed from sand to crushed marble as aggregate for making extra white cement products.

Claims Talc Gives Strength and Density

A LONG ISLAND manufacturer is experimenting with a new admixture for concrete made from talc. The claim is that its use results in a dense, waterproof product with a considerable increase in strength over ordinary concrete. These qualities, if substantiated, together with its ease of workability, will give it a strong appeal to manufacturers of concrete products.

Concrete Products for Model Firesafe Home

A MODEL firesafe home is being built in Sioux City, Iowa, and will be constructed of concrete block and other products of concrete. These will be furnished by several manufacturers of that city, including the Art Stone Products Co., Eureka Cement Works, Concrete Products Co. and Shook and Halverson.

Will Make Trim Stone

THE Cast Stone Products Co. of Cedar Rapids, Iowa, has recently taken up the manufacture of trim stone for buildings and has added buildings and facilities to its plant to care for this new department.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., at producing point or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chaumont, N. Y.	.50	.....	1.75	1.50	1.50	1.50
Chazy, N. Y.	.75	1.65	1.65	1.40	1.40	1.40
Cobleskill, N. Y.	1.50	1.35	1.25	1.25	1.25	.....
Dundas, Ont.	.53	1.05	1.05	.90	.90	.90
Frederick, Md.	.50@ .75	1.25@1.35	1.20@1.30	1.10@1.20	1.05@1.10	1.05@1.10
Munns, N. Y.	1.00	1.35	1.35	1.25	.....	.....
Northern New Jersey	1.60	1.50@1.80	1.30@2.00	1.40@1.60	1.40@1.60	.....
Prospect, N. Y.	1.00	1.50	1.40	1.30	1.30	.....
Walford, Penn.	.70	1.35	1.35	1.35	1.35	1.50
Watertown, N. Y.	.50	.....	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL						
Afton, Mich.	.....	.....	.50	.....	.....	1.50
Alton, Ill.	1.85	.....	1.85	.....	.....	.....
Bloomville, Middlepoint, Dunkirk, Bellevue, Waterville, No. Baltimore, Holland, Kenton, New Paris, Ohio; Monroe, Mich.; Huntington, Bluffton, Ind.	1.00	1.10	1.10	1.00	1.00	1.00
Buffalo and Linwood, Iowa	1.10	.....	1.10	.90	.95	.95
Chasco, Ill.	1.25	.....	.....	.....	.....	1.15
Columbia and Krause, Ill.	1.00@1.50	.90@1.10	1.20@1.35	1.00@1.20	.90@1.20	.....
			Flux 1.50@1.75			
Cypress, Ill.	1.15	1.15	1.15	1.15	1.05	1.00
Greencastle, Ind.	1.30	1.25	1.15	1.05	.95	.95
Lannon, Wis.	.80	1.00	1.00	.90	.90	.90
Milltown, Ind.	.....	.90@1.00	.75@ .85	.90@1.00	.85@ .90	.85
Northern New Jersey	1.30	.....	1.80	1.60	1.40	.....
River Rouge, Mich.	1.10	1.10	1.10	1.10	1.10	1.10
St. Vincent de Paul, Que.	.80	1.25	.90	.85	.85	1.00
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	.....
Toledo, Ohio	1.60	1.70	1.70	1.60	1.60	1.60
Stone City, Iowa	.75	.....	†1.10	1.05	1.00	.....
Waukesha, Wis.	.90	.90	.90	.90	.90	.90
SOUTHERN:						
Alderson, W. Va.	.60	1.45	1.35	1.25	1.20	1.15
Allgood, Ala.			Crusher run, fines out, for flux, 1.00 per net ton			
Cartersville, Ga.	1.00	1.50	1.50	1.15	1.15	.....
Chico, Texas	1.00	1.35	1.30	1.25	1.15	1.10
El Paso, Tex.	1.00	1.00	1.00	1.00	.....	.....
Ft. Springs, W. Va.	.50	1.60	1.50	1.35	1.25	.....
Graystone, Ala.			Crusher run fluxing stone, 1.00 per net ton			
Henderson, N. C.	.....	.....	1.50	.....	1.25	.....
McCook, Ill.	1.00	1.25	1.25	1.25	1.25	1.25
New Braunfels, Tex.	.30@1.00	1.00@1.30	1.00@1.30	.70@1.00	.70@ .90	.....
Olive Hill, Ky.	.50@1.00‡	1.00	1.00	1.00	1.00	1.00
Rocky Point, Va.	.50@1.00	1.40@1.60	1.30@1.40	1.15@1.35	1.10@1.20	1.00@1.05
WESTERN:						
Atchison, Kans.	.25	2.00	2.00	2.00	2.00	1.80
Blue Springs & Wymore, Neb.	.25	1.45	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.25	1.25	1.25	1.25	1.10	.....
Kansas City, Mo.	.75	1.50	1.50	1.50	1.50	1.50
Limestone, Wash.	3.00	3.00	3.00	3.00	3.00	3.00
Rock Hill, St. Louis Co., Mo.	1.30	1.30	1.35	1.35	1.35	1.30

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.80	1.70	1.45	1.20	1.05	.....
Duluth, Minn.	.90	2.25	1.90	1.50	1.35	1.35
Dwight, Calif.	1.00	1.00	1.00	.90	.90	.....
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Texas	2.50	1.25	1.55	1.35	1.25	.....
New Haven, New Britain, Meriden & Wallingford, Conn.	.80	1.70	1.45	1.20	1.05	1.05
Northern New Jersey	1.50	2.00	1.80	1.40	1.40	.....
Oakland and El Cerritto, Cal.	1.00	1.00	1.00	.90	.90	.....
San Diego, Calif.	.....	2.75	2.55	2.35	2.35	.....
Sheboygan, Wis.	1.00	1.10	1.10	1.10	1.10	.....
Springfield, N. J.	1.60	2.00	2.00	1.70	1.60	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley, Montello and Red Granite, Wis.—Granite	1.80	1.70	1.50	1.40	1.40	.....
Coldwater, N. Y.—Dolomite			1.50 all sizes			
Columbia, S. C.—Granite	.....	.....	1.75	.....	1.50	.....
Eastern, Penn.—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Penn.—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Havelock, Ontario	.....	2.60	2.10	2.10	.....	.....
Lithonia, Ga.	.75a	2.00	1.60	1.35	1.30	1.25
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	.....
Middlebrook, Mo.—Granite	3.00@3.50	.....	2.00@2.25	2.00@2.25	.....	1.25@2.00
Northern New Jersey (Basalt)	1.50	2.00	1.80	1.40	1.40	.....
Richmond, Calif.—Quartzite	.75	.....	1.00	1.00	1.00	.....
Somerset, Pa. (sand-rock)	1.85@2.00a	.....	1.35@1.50	.....	1.00@1.50	.....
Toccoa, Ga.—Granite	.50	1.50	1.50	1.40	1.35	1.35

*Cubic yd. †1 in. and less. ‡Two grades. ‖Rip rap per ton. (a) Sand. (b) to ¼ in. (c) 1 in., 1.40. (d) 2 in., 1.30. (e) Dust. (f) ¼ in. (h) less 10c discount. (i) 1 in., 1.40.

Agricultural Limestone

(Pulverized)

Alderson, W. Va.—50% thru 50 mesh	1.50
Alton, Ill.—Analysis 99% $CaCO_3$, 0.3% $MgCO_3$; 90% thru 100 mesh	6.00
Asheville, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk	2.75
Atlas, Ky.—90% thru 100 mesh	2.00
50% thru 100 mesh	1.00
Belfast and Rockland, Me. (rail), Lincolnville, Me. (water), analysis $CaCO_3$ 90.04%; $MgCO_3$ 1.5%, 100% thru 14 mesh, bags	4.50
Bulk	3.50
Branchton and Osborne, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers)	5.00
Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; pulverized; 50% thru 50 mesh	1.50
Cartersville, Ga.—Pulverized, 2.25; 50% thru 50 mesh	1.50
Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk	2.50
Chico, Texas.—50% thru 50 mesh, bulk	1.75
Colton, Calif.—Analysis 90% $CaCO_3$, bulk	4.00
Cypress, Ill.—90% thru 100 mesh	1.35
Henderson, N. C. (paving dust)—80% thru 200 mesh, bags	4.25@ 4.75
Bulk	3.00@ 3.50
Analysis $CaCO_3$, 56%; $MgCO_3$, 42%; 65% thru 200 mesh, bags	3.95
Bulk	2.70
Hillsville, Penn.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$; 75% thru 100 mesh; sacked	5.00
Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk	2.50
Joliet, Ill.—85% thru 200 mesh	4.25
Knoxville, Tenn.—Analysis, 52% $CaCO_3$, 37% $MgCO_3$; 80% thru 100 mesh; bags, 3.75; bulk	2.50
Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80 lb. paper sacks, 5.00; bulk	3.50
Marion, Va.—Analysis, 90% $CaCO_3$, pulverized, per ton	2.00
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 90% thru 100 mesh	3.90@ 4.50
Milltown, Ind.—Analysis, 94.50% $CaCO_3$, 33% thru 50 mesh, 40% thru 50 mesh; bulk	1.35@ 1.60
Olive Hill, Ky.—50% thru 50 mesh, 2.00; 90% thru 4 mesh	1.00
Piqua, Ohio—Total neutralizing power 95.3%; 99% thru 10, 60% thru 50; 50% thru 100	2.50@ 2.75
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.10; bulk	3.60
99% thru 100, 85% thru 200; bags, 7.00; bulk	5.50
Rocky Point, Va.—Analysis 99.5% $CaCO_3$, 0.25% $MgCO_3$; 50% thru 200 mesh; bags, 3.25@3.50; bulk	2.00
Toledo, Ohio. 30% through 50 mesh	2.25
Waukesha, Wis.—90% thru 100 mesh, 4.50; 50% thru 100 mesh, 2.10; 90% thru 50 mesh	1.65
Watertown, N. Y.—Analysis, 96-99% $CaCO_3$; 50% thru 100 mesh; bags, 4.00; bulk	2.50
West Stockbridge, Mass.—Analysis 90% $CaCO_3$, 50% thru 100 mesh; cloth bags, 4.75; paper, 4.25; bulk	3.25

Agricultural Limestone

(Crushed)

Alton, Ill.—Analysis 99% $CaCO_3$, 0.3% $MgCO_3$; 50% thru 4 mesh	3.00
Atlas, Ky.—50% thru 4 mesh	.50
Bedford, Ind.—Analysis, 98.5% $CaCO_3$, 0.5% $MgCO_3$; 90% thru 10 mesh	1.50
Blackwater, Mo.—Analysis, 99% $CaCO_3$; 90% thru 4 mesh	.75
Bridgeport and Chico, Texas—Analysis. 94% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh	1.75
50% thru 4 mesh	1.50
Chasco, Ill.—50% thru 100 mesh	1.20
Chico, Texas—50% thru 4 mesh; bulk	1.50

(Continued on next page)

Agricultural Limestone

Chicago, Ill.—50% thru 100 mesh; 90% thru 4 mesh ..... .80

Columbia, Krause, Valmeyer, Ill.—Analysis, 90% $CaCO_3$; 90% thru 4 mesh 1.35

Cypress, Ill.—90% thru 50 mesh, 50% thru 100 mesh, 90% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh 1.35

Dundas, Ont.—Analysis, 53.8% $CaCO_3$; $MgCO_3$, 43.3%. 50% thru 50 mesh; bags, $4.75; bulk 3.00

Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh 1.50

Garnet, Okla.—All sizes 1.25

McCook, Ill.—Analysis, approx. 60% $CaCO_3$, 40% $MgCO_3$; 90% thru 4 mesh ..... .90

Kansas City, Mo.—50% thru 100 mesh ..... .75

Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% through 10 mesh; 46% through 60 mesh 2.00

Screenings (¼ in. to dust) 1.00

Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$, 32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% thru 4 mesh (meal) bulk 1.60

Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 50% thru 50 mesh ..... 1.85@ 2.35

Middlepoint, Bellevue, Kenton, Ohio; Monroe, Mich.; Huntington and Bluffton, Ind.—Analysis, 42% $CaCO_3$, 54% $MgCO_3$; meal, 25 to 45% thru 100 mesh 1.60

Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh 1.50

Monroe, Mich. — Analysis, 52.03%

Monroe, Mich. — Analysis, $CaCO_3$, 52.03%; 42.25% $MgCO_3$; 30% thru 100 mesh 2.30

Mountville, Va. — Analysis, 62.54% $CaCO_3$; $MgCO_3$, 35.94%, 100% thru 20 mesh 5.50

Pixley, Mo.—Analysis, 96% $CaCO_3$; 50% thru 50 mesh 1.25

50% thru 100 mesh; 90% thru 50 mesh; 50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh 1.65

River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk ..... .80@ 1.40

Stone City, Iowa. — Analysis, 98% $CaCO_3$; 50% thru 50 mesh ..... .75

Tulsa, Okla.—Analysis $CaCO_3$, 86.15%, 1.25% $MgCO_3$, all sizes 1.25

Pulverized Limestone for Coal Operators

Hillsville, Penn., sacks, 4.50; bulk 3.00

Joliet, Ill.—85% thru 200 mesh 4.25

Piqua, Ohio, sacks, 4.50@5.00 bulk ..... 3.00@ 3.50

Rocky Point, Va.—80% thru 200 mesh; bags, 4.25@4.75; bulk ..... 3.00@ 3.50

Waukesha, Wis.—90% thru 100 mesh, bulk 4.50

Glass Sand

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Berkeley Springs, W.Va.—Glass sand 2.25

Cedarville and S. Vineland, N. J.—

Damp 1.75

Dry 2.25

Cheshire, Mass.:

6.00 to 7.00 per ton; bbl 2.50

Columbus, Ohio ..... 1.00@ 1.25

Estill Springs and Sewanee, Tenn. 1.50

Franklin, Penn. 2.00

Gray Summit and Klondike, Mo. 2.00

Los Angeles, Calif.—Washed 5.00

Mapleton Depot, Penn. ..... 2.00@ 2.25

Massillon, Ohio 3.00

Mineral Ridge and Ohlton, Ohio 2.50

Oceanside, Calif. 3.00

Ottawa, Ill. ..... .75@ 1.25

Pittsburgh, Penn.—Dry 4.00

Damp 3.00

Red Wing, Minn.:

Bank run 1.50

Ridgway, Penn. 2.50

Rockwood, Mich. ..... 2.75@ 3.25

Round Top, Md. 2.25

San Francisco, Calif. ..... 4.00@ 5.00

St. Louis, Mo. 2.00

Sewanee, Tenn. 1.50

Thayers, Penn. 2.50

Utica, Ill. ..... 1.00@ 1.25

Zanesville, Ohio 2.50

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Beach City, Ohio		1.50@ 1.75
Columbus, Ohio		.30@ .80
Eau Claire, Wis.	4.25	*.40@ 1.00
Estill Springs and Sewanee, Tenn.	1.35@ 1.50	1.35@ 1.50

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in and less
EASTERN:						
Ambridge & So. H'g'ts, Penn.	1.25	1.25	1.15	.85	.85	.85
Attica and Franklinville, N. Y.	.75@ .85	.75	.85	.75	.75	.75
Boston, Mass.‡	1.40	1.40	2.25		2.25	2.25
Buffalo, N. Y.	1.10	.95			.85	
Erie, Pa.		1.00*		1.50*	1.75*	
Farmingdale, N. J.	.58	.48	.75	1.20	1.10	
Hartford, Conn.	.65*					
Leeds Junction, Me.		.50	1.75		1.35	1.25
Machias Jct., N. Y.		.75	.75		.75	
Montoursville, Penn.	1.00	1.00	.90	.75	.75	.75
Northern New Jersey	.40@ .50		1.25		1.25	
Olean, N. Y.		.75	.75		.75	
Shining Point, Penn.			1.00	1.00	1.00	1.00
Somerset, Pa.		1.85			1.50	
South Heights, Penn.	1.25	1.25	.85	.85	.85	.85
Washington, D. C.	.85	.85	1.70	1.50	1.30	1.30
CENTRAL:						
Algonquin and Beloit, Wis.	.50	.40	.60	.60	.60	.60
Appleton and Mankato, Minn.	.55	.45		1.25	1.25	1.25
Attica, Ind.			All sizes .75@.85			
Aurora, Oregon, Sheridan, Moronts, Yorkville, Ill.	.40@ .50	.40@ .60	.20@ .50	.50@ .60	.60	.55@ .60
Barton, Wis.		.50		.70	.70	.70
Chicago, Ill.	.70	.60	.50	.60	.60	.60
Columbus, Ohio		.70	.70	.70	.70	
Des Moines, Iowa	.40	.40	1.50	1.50	1.50	1.50
Eau Claire, Wis.	.40	.45	.95	1.00	.95	.95
Elgin, Ill.		.20*	.50*	1.50*	1.50*	1.50*
Elkhart Lake, Wis.	.40	.40	.50	.50	.40	.40
Ferrysburg, Mich.		.50@ .80	.60@1.00	.60@1.00		.50@1.25
Ft. Dodge, Iowa	.85	.85	2.05	2.05	2.05	2.05
Ft. Worth, Texas	2.00	2.00	2.00	2.00	2.00	2.00
Grand Haven, Mich.		.60@ .80		.60@1.00		.60@1.00
Grand Rapids, Mich.		.50		.80	.80	.70
Hamilton, Ohio		1.00			1.00	
Hersey, Mich.		.50				.70
Humboldt, Iowa	.40@ .60	.40@ .60	1.40@1.60	1.40@1.60	1.40@1.60	1.40@1.60
Indianapolis, Ind.	.60	.60		.90	.75@1.00	.75@1.00
Jedbury and St. Louis, Mo.	.75	.90	1.00	.90	.90	.90
Joliet, Plainfield and Hammond, Ill.	.60	.50	.50	.60	.60	.60
Mason City, Iowa	.50	.50	1.45	1.45	1.45	1.35
Mattoon, Ill.	.75	.75	.75	.75	.75	.75
Milwaukee, Wis.		1.01	1.21	1.21	1.21	1.21
Moline, Ill.	.60@ .85	.60@ .85	1.00@1.20	1.00@1.20	1.00@1.20	1.00@1.20
Northern New Jersey	.70	.70			1.60	
Oregon City, Ore.		1.25	1.25	1.25	1.25	1.25
Palestine, Ill.	.75	.75	.75	.75	.75	.75
Silverwood, Ind.	.75	.75	.75	.75	.75	.75
Terre Haute, Ind.	.75	.60	.90	.75	.75	.75
Wolcottville, Ind.	.75	.75	.75	.75	.75	.75
Waukesha, Wis.		.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	1.50	1.25	1.10	1.10
Zanesville, Ohio		.60	.50	.60	.80	
SOUTHERN:						
Charleston, W. Va.		All sand, 1.40.		All gravel, 1.50.		
Chattanooga, Tenn.		1.65			1.45	
Knoxville, Tenn.	1.00	1.00	1.20	1.20	1.20	1.20
Lindsay, Texas					.55	
Macon, Ga.	.50	.50				.80@ .90
New Martinsville, W. Va.	1.00	.90@1.00		1.20@1.30		
Roseland, La.	.60	.50	1.50	1.10	1.10	
WESTERN:						
Kansas City, Mo.	1.00	.70				
Los Angeles, Calif. (points all around) (d)	.60	.50	.85	.85	.85	.85
Los Angeles district (bunkers) †	1.50	1.40	1.85	1.85	1.85	1.85
Phoenix, Ariz.	1.25*	1.00*	2.50*	2.00*	1.75*	1.50*
Pueblo, Colo.	.80	.65		1.35		1.20
San Diego, Calif.	.65@ .75	.65@ .75	1.50	1.30	1.10	1.10
Seattle, Wash. (bunkers)	1.50*	1.50*	1.50*	1.50*	1.50*	1.50*

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			Dust to 3 in., .40			
Chicago, Ill.						.40
Dudley, Ky.	1.10	1.00	.90			
East Hartford, Conn.			Sand, .75*			
Ferrysburg, Mich.						.65@1.00
Gainesville, Texas		.95				.55
Grand Haven, Mich.						.80
Grand Rapids, Mich.				.60		
Hamilton, Ohio					.70	
Hersey, Mich.				.50		
Indianapolis, Ind.			Mixed gravel for concrete work, at .65			
Joliet, Plainfield and Hammond, Ill.	.35					
Lindsay, Texas						.55
Macon, Ga.	.35	.35				
Mankato, Minn.			Pit run sand, .70			
Moline, Ill. (b)	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Ottawa, Oregon, Moronts and Yorkville, Ill.			Ave. .60 per ton all sizes			
Roseland, La.					.85	
St. Louis, Mo.			Mine run gravel, 1.55 per ton			
Shining Point, Penn.			Concrete sand, 1.10 ton			
Smithville, Texas	.50	.50	.50	.50	.50	.54
Summit Grove, Ind.	.50	.50	.50	.50	.50	.54
Waukesha, Wis.	.60	.60	.60	.60	.60	.64
Winona, Minn.	.60	.60	.60	.60	.60	.60
York, Penn.	1.00	1.10				

(a) ¾ in. down. (b) River run. (c) 2½ in. and less.
*Cubic yd. †Include freight and bunkerage charges and truck haul. ‡Delivered on job.
(d) Less 10c per ton if paid E.O.M. 10 days. (e) pit run. (f) plus 15c winter loading charge.

Core and Foundry Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

City or shipping point	Molding, fine	Molding, coarse	Molding, brass	Core	Furnace lining	Sand blast	Stone sawing
Aetna, Ill.				.30@ .35			
Albany, N. Y.	2.25	2.00	2.25			3.50	
Arenzville, Ill.	1.50@1.75			1.00			
Beach City, Ohio	2.00@2.25	2.00		1.75	2.00@2.50		1.75
Columbus, Ohio	1.50@2.00	1.25@1.75	2.00@2.50	.30@1.00	2.00@2.50	3.50@4.00	1.25@1.50
Eau Claire, Wis.				1.25		3.00	
Elco, Ill.	Ground silica per ton in carloads—18.00@31.00						
Elnora, N. Y.			1.75				
Estill Springs and Sewanee, Tenn.	1.25			1.25		1.35@1.50	
Franklin, Penn.	1.75	1.75		1.75			
Joliet, Ill.	No. 2 molding sand; loam for luting and open hearth work—.65@.85						
Kasota, Minn.							1.00@1.25
Klondike, Mo.	1.75		2.00	1.75	1.75		1.25
Mapleton Depot, Penn.	2.25	2.00		2.00	2.00	2.25	
Massillon, Ohio	2.50	2.50		2.50	2.50		
Michigan City, Ind.				.30@ .35			
Mineral Ridge and Ohlton, Ohio	1.75*	1.75*		2.00*	1.75*	2.00*	1.75*
Montoursville, P'n.				1.25@1.35			
New Leyington, O.	2.00	1.50					
Ottawa, Ill.		.75@1.00†					
Red Wing, Minn.	1.25		1.25	1.50	1.50	3.50	1.50
Ridgeway, Penn.	1.50	1.50					
Round Top, Md.	1.50	1.50		1.60		2.25	
San Francisco, Calif.	3.50	4.75	3.50	3.50@5.00	3.50@4.50	3.50@5.00	
Tamalco, Ill.		1.40@1.60					
Tamms, Ill.	Ground silica per ton in carloads—20.00@31.00						
Thavers, Penn.	1.25	1.25		2.00			
Utica, Ill.	.60	.65		.75	.75		
Utica, Penn.	1.75	1.75		2.00			
Warwick, Ohio	1.75*@2.25	1.75*		1.75*@2.25			
Zanesville, Ohio	1.75	1.25@1.50	1.75				

*Green. †Crude silica, crushed and screened, not washed or dried. ‡Plus 75c per ton for winter loading. ¶Crude. §Crude and dry.

Crushed Slag

City or shipping point EASTERN:	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in and less	2½ in. and less	3 in. and larger
Buffalo, N. Y., Emporium and Dubois, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Eastern Penn.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Northern, N. J.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
Reading, Pa.	2.50	1.00		1.25			
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05*	1.45*	1.80*	1.45*	1.45*	1.45*	1.45*
Jackson, Ohio		1.05*		1.30*	1.05*	1.30*	1.30*
Toledo, Ohio	1.50	1.35	1.35	1.35	1.35	1.35	1.35
Youngst'n, O., dist.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.		1.55*		1.55*	1.55*	1.55*	1.55*
Ensley and Alabama City, Ala.	2.05	.80	1.35	1.25	.90	.90	.80
Longdale, Roanoke, Ruessens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15
Woodward and East Birmingham, Ala.	2.05	.75		1.25	.90@1.05	.90	

*5c per ton discount on terms.

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.			12.00					2.20
Buffalo, N. Y.		12.00	12.00	12.00			10.00	1.95d
Chazy, N. Y.	12.50	10.50	8.00	12.00	11.50	16.50	10.00	2.50z
Lime Ridge, Penn.							5.00a	
West Stockbridge, Mass.	12.00	10.00	5.60					2.00t
Williamsport, Penn.			10.00				6.00	
York, Penn.		9.50	9.50	10.50	8.50	10.50	8.50	1.65i
CENTRAL:								
Carey, Ohio	12.50	8.50	8.00		9.00		8.50	1.50
Cold Springs, Ohio	12.50	8.50	8.50		9.00		8.00	
Delaware, Ohio	12.50	10.00	9.00	10.00			9.00	1.50
Frederick, Md.		9.50	9.50	9.50	8.00	9.50	7.50	1.45e
Gibsonburg, Ohio	12.50							
Huntington, Ind.	12.50	8.50	8.50		9.00		8.00	
Luckey, Ohio (f)	12.50	8.50	8.50					1.50s
Marblehead, Ohio		8.50	8.50		9.00		8.00	1.50w
Marion, Ohio		8.50	.850				8.00	1.70d
Milltown, Ind.		9.00@10.00		10.00p	8.00q			1.40r
Sheboygan, Wis.	11.50				9.50		9.50	.95
Tiffin, Ohio					9.00			
White Rock, Ohio	12.50				9.00	11.00	8.00	
Wisconsin points (f)		11.50					9.50	
Woodville, Ohio	12.50	8.50	8.00	13.50	9.00	11.00t	9.00	1.50c
SOUTHERN:								
Allgood, Ala.	12.50	10.00			8.50		8.50	1.50
El Paso, Tex.							14.00	1.75
Graystone, Ala.	12.50	10.00		12.50			8.50	1.50
Keystone, Ala.	12.50	10.00	10.00	10.00			8.50	1.50u
Knoxville, Tenn.	20.25	10.00		10.00			8.50	1.50
Ocala, Fla.		13.50	10.00				12.50	1.70
WESTERN:								
Calcite, Colo.							9.25	
Kirtland, N. M.							15.00	
Limestone, Wash.	15.00	15.00	10.00	15.00	16.50	16.50	16.50	2.09
Dittlinger, Tex.		12.00@13.00					9.50p	1.50s
San Francisco, Calif.	19.50@21.00	18.00@20.00	15.00	18.50			14.00s	2.00
Tehachapi, Calif.			8.00				13.00z	2.20x
Seattle, Wash.	19.00	19.00	12.00	19.00	19.00		18.60	2.30

†50-lb. paper bags; (a) run of kilns; (c) wooden, steel 1.70; (d) steel; (e) per 180-lb. barrel; (f) dealers' prices, net 30 days less 25c disc. per ton on hydrated lime and 5c per bbl. on lump if paid in 10 days; (i) 180-lb. net barrel, 1.65; 280-lb. net barrel, 2.65; (p) to 10.50; (q) to 8.50; (r) to 1.50; (s) in 80-lb. burlap sacks; (t) to 3.00; (u) two 90-lb. bags; (v) oil burnt; wood burnt 2.25@2.50; (x) wood, steel 2.30; (z) to 15.00; (*) quoted f.o.b. New York; (‡) paper bags; (w) to 1.50 in two 90-lb. bags, wood bbl. 1.60; (1) to 10.00; (1) 80-lb. paper bags; (2) to 3.00; (3) to 9.00; (4) to 1.60. (5) to 16.00; (6) wood bbl., steel, 1.80.

Miscellaneous Sands

(Continued)

City or shipping point	Roofing sand	Traction
Gray Summit and Klondike, Mo.		1.75
Mapleton Depot, Penn.	2.00	2.00
Massillon, Ohio		2.25
Mineral Ridge and Ohlton, Ohio	*1.75	*1.75
Montoursville, Penn.		1.25
Ottawa, Ill.	1.00@ 1.50	
Red Wing, Minn.		1.25
Round Top, Md.	2.25	1.75
San Francisco, Calif.	3.50@ 4.50	3.50@ 4.50
Thayers, Penn.		2.25
Utica, Ill.	1.00@ 1.25	1.00
Warwick, Ohio		2.25
Zanesville, Ohio		2.50

*Wet.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Baltimore, Md.:	
Crude talc (mine run)	3.00@ 4.00
Ground talc (20-50 mesh), bags	10.00
Cubes	55.00
Blanks (per lb.)	.08
Pencils and steel worker's crayons, per gross	.08 1.25
Chatsworth, Ga.:	
Crude Talc	5.00
Ground (150-200 mesh), bulk	12.00
Pencils and steel worker's crayons, per gross	1.00@ 2.50
Chester, Vt.:	
Ground talc (150-200 mesh), bulk	9.00@10.00
Including bags	10.00@11.00
Chicago and Joliet, Ill.:	
Ground (150-200 mesh), bags	30.00
Dalton, Ga.:	
Crude talc	5.00
Ground talc (150-200) bags	10.00@12.00
Pencils and steel workers' crayons, per gross	1.00@ 1.50
Emeryville, N. Y.:	
(Double air floated) including bags;	
325 mesh	14.75
200 mesh	13.75
Hailesboro, N. Y.:	
Ground white talc (double and triple air floated) including bags, 300-350 mesh	15.50@20.00
Henry, Va.:	
Crude (mine run)	3.50@ 4.50
Ground talc (150-200 mesh), bulk	8.75@16.00
Joliet, Ill.:	
Roofing talc, bags	12.00
Ground talc (200 mesh), bags	30.00
Keeler, Calif.:	
Ground (200-300 mesh), bags	20.00@30.00
Natural Bridge, N. Y.:	
Ground talc (300 mesh), bags	13.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Gordonsburg, Tenn.—B.P.L. 65-70%	4.50@ 5.00
Mt. Pleasant, Tenn.—B.P.L. 65%	8.00
Tennessee—F.O.B. mines, gross ton, unground brown rock, B.P.L. 72%	5.00
B.P.L. 75%	6.00
Twomey, Tenn.—B.P.L. 65%, 2000 lb.	7.25@ 8.25

Ground Rock

(2000 lbs.)

Centerville, Tenn.—B.P.L. 65%	7.00
Gordonsburg, Tenn.—B.P.L. 65-70%	4.00@ 4.50
Mt. Pleastnt, Tenn.—B.P.L. 65%	7.25@ 9.25
Twomey, Tenn.—B.P.L. 65%	8.00@ 9.00

Florida Phosphate

(Raw Land Pebble)

(Per Ton.)

Florida—F. O. B. mines, gross ton,	
68/66% B.P.L., Basis 68%	3.25
70% min. B.P.L., Basis 70%	3.75
72% min. B.P.L., Basis 72%	4.25
75/74% B.P.L., Basis 75%	5.25
77/76% B.P.L., Basis 77%	6.25

Mica

Prices given are net, F.O.B. plant or nearest shipping point.

Pringle, S. D.—Mine run, per ton	125.00@150.00
Punch mica, per lb.	.06
Scrap, per ton, carloads	20.00
Rumney Depot, N. H. — per ton,	
mine run	360.00
Mine scrap	24.00
Clean shop scrap	27.00
Dry ground, 20 mesh	28.00
40 mesh	35.00
60 mesh	40.00
100 mesh	60.00
200 mesh	80.00
Roofing mica	27.00
Punch mica, per lb.	.10

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Barton, Wis., f.o.b. cars		10.50
Brandon, Vt.—English pink and English cream	*11.00	*11.00
Brandon grey	*11.00	*11.00
Brighton, Tenn.—Pink		†6.00
Buckingham, Que.—Buff stucco dash		‡12.00@14.00
Chicago, Ill. — Stucco chips, in sacks f.o.b. quarries		17.50
Crown Point, N. Y.—Mica Spar		8.00@10.00
Easton, Penn., and Phillipsburg, N. J.	10.00@16.00	10.00@16.00
Haddam, Conn. — Felstone buff	15.00	15.00
Harrisonburg, Va.—Bulk marble (crushed, in bags)	†12.50	†12.50
Ingomar, Ohio — Concrete facings and stucco dash		6.00@16.00
Middlebrook, Mo.—Red		20.00@25.00
Middlebury and Brandon, Vt.—Middlebury white		‡9.00
Milwaukee, Wis.		14.00@34.00
Newark, N. J.—Roofing granules		7.50
New York, N. Y.—Red and yellow Verona		32.00
Red Granite, Wis.		7.50
Sioux Falls, S. D.	7.50	7.50
Stockton, Calif. — "Natrock" roofing grits		15.00@20.00
Tuckahoe, N. Y.		12.00
Villa Grove, Colo.		13.00
Warren, N. H.—cement facing (mica), per ton		7.50
Wauwatosa, Wis.		16.00@45.00
Wellsville, Colo.—Colorado Travertine Stone †C.L.	15.00	15.00

*C.L. including bags; L.C.L. 12.50.
‡C.L. including bags, L.C.L. 10.00.

Potash Feldspar

Auburn and Brunswick, Me.—Color, white; 98% thru 140 mesh bulk — 19.00

Bath, Me.—Color, white; analysis, potash, 12%; 100% thru 180 mesh, bags, 21.00; bulk — 18.00

Buckingham, Que.—Color, white; analysis, K_2O, 12-13%; Na_2O, 1.75%; bulk — 9.00

De Kalb Jct., N. Y.—Color, white; bulk (crude) — 9.00

East Hartford, Conn.—Color, white, 95% through 60 mesh, bags — 16.00
96% thru 150 mesh, bags — 23.00

Erwin, Tenn.—Color, white; analysis, 12.07% K_2O, 19.34% Al_2O_3; Na_2O, 2.92%; SiO_2, 64.76%; Fe_2O_3, .36%; 98.50% thru 200 mesh, bags, 16.90; bulk — 15.50

Glen Tay Station, Ont., color, red or punk; analysis: K_2O, 12.81%, crude (bulk — 6.75@ 7.00

Keystone, S. D.—Prime white, bulk (crude) — 8.00

Los Angeles, Calif.—Color, white; analysis, K_2O, 10.35%; Na_2O, 3.62%; Al_2O_3, 18.71%; SiO_2, 65.48%; Fe_2O_3, .17%; 95% thru 200 mesh, bags included, carloads — 22.00
Bulk — 20.00

Murphysboro, Ill.—Color, snow white; analysis SiO_2, 64.4%; K_2O, 13%; Na_2O, 2.5%; Fe_2O_3, 0.07%; Al_2O_3, 19.3%; 98% thru 200 mesh, bags — 21.00
Bulk — 20.00

Penland, N. C.—Color, white; crude, bulk — 8.00
Ground, bulk — 16.50

Tenn. Mills—Color, white; analysis K_2O, 18%; Na_2O_3, 10%; 68% SiO_2; 99% thru 200 mesh; bulk — 18.00
99% thru 140 mesh, bulk — 16.00

Toughkenamon, Pa.—Color, white to light cream; 98% thru 150 mesh, bags, 11.00@13.00; bulk — 10.00

Toronto, Can.—Color, flesh; analysis K_2O, 12.75%; Na_2O, 1.96%; crude — 7.50@ 8.00

Trenton, N. J.—Crude, bulk — 12.00@27.00
99% thru 140 mesh; bulk — 16.00
(Bags 11 cents each, non-returnable)

Wheeling, W. Va.—Color, white; analysis, K_2O, 9.50%; Al_2O_3, 16.70%; Na_2O, 3.50%; SiO_2, 69.50%; 99% thru 140 mesh, bulk — 19.00

Blended Feldspar

(Pulverized)

Tenn. Mills—Bulk — 16.00@20.00

Chicken Grits

Afton Mich. (limestone) per ton — 10.00
Belfast and Rockland, Me.—(Limestone), bags, per ton — ‡10.00
Brandon and Middlebury, Vt., per ton — 12.00‡
Centerville, Iowa (gypsum) per ton — 18.00
Chico, Texas (limestone), 100 lb. bags, per ton — 8.00@ 9.00
Los Angeles Harbor (limestone), 100-lb. sack, 1.00; sacks, per ton, 8.50@ 9.50†; bulk, per ton — 6.00@7.00†
Toughkenamon, Pa.—(Feldspar) 100-lb. bags, 1.00; bulk, per ton — 10.00
Gypsum, Ohio.—(Gypsum) per ton — 10.00
Limestone, Wash. (limestone) per ton — 12.50
Rocky Point, Va. (limestone) 100 lb. bags, 75c; sacks, per ton, 6.00 bulk — 5.00
Seattle, Wash.—(Limestone), bulk, per ton — 12.50
Warren, N. H.—(Mica) per ton — 7.80
Waukesha, Wis.—(Limestone), per ton — 8.00
West Stockbridge, Mass.—(Limestone) bulk — 7.50@9.00*

*L.C.L.
†Less than 5-ton lots.
‡C.L.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis. — 10.50
Boston, Mass. — *17.00
Brighton, N. Y. — *19.75
Dayton, Ohio — 12.50@13.50
Detroit, Mich. — ‡17.50
Farmington, Conn. — 17.00
Flint, Mich. — ¶12.50@16.00
Grand Rapids, Mich. — 12.00
Hartford, Conn. — *20.00
Jackson, Mich. — 13.00
Lancaster, N. Y. — 13.00
Madison, Wis. — †a14.00
Michigan City, Ind. — 12.00
Milwaukee, Wis. — *13.00
Minneapolis and St. Paul, Minn. — 11.25
New Brighton, Minn. — 10.00
Pontiac, Mich. — 11.00@12.00
Portage, Wis. — 15.00
Prairie du Chien, Wis. — 18.00@22.50
Rochester, N. Y. — 19.75
Saginaw, Mich. — 13.50
San Antonio, Texas — 13.00
Syracuse, N. Y. — 20.00
Toronto, Canada — 13.10@15.60†
Toronto, Canada — 13.00
Wilkinson, Fla. — 10.00@12.00

*Delivered on job. †Delivered in city limits.
‡Less 5%. ¶Dealers' price. (a) Less 1.00 E.O. M. 10 days.

Portland Cement

Prices per bag and per bbl, without bags net in carload lots.

	Per Bag	Per Bbl.
Albuquerque, N. M.		3.47
Atlanta, Ga.		2.35
Baltimore, Md.		1.70@2.35
Birmingham, Ala.		2.30
Boston, Mass.		1.81@2.63‡
Buffalo, N. Y.		1.67@2.38‡
Butte, Mont.	.90¼	3.61
Cedar Rapids, Iowa		2.34‡
Charleston, S. C.		2.35
Cheyenne, Wyo.	.82¼	3.31
Cincinnati, Ohio		2.37‡
Cleveland, Ohio		2.29‡
Chicago, Ill.		2.10‡
Columbus, Ohio		2.34
Dallas, Texas		2.10
Davenport, Iowa		2.29‡
Dayton, Ohio		2.38
Denver, Colo.	.66¼	2.65
Detroit, Mich.		2.15‡
Duluth, Minn.		2.09‡
Houston, Texas		2.60
Indianapolis, Ind.		2.29‡
Jackson, Miss.		2.60
Jacksonville, Fla.		2.35
Jersey City, N. J.		1.85@2.33
Kansas City, Mo.		2.02‡
Los Angeles, Calif.	.61†	2.44†
Louisville, Ky.		2.27
Memphis, Tenn.		2.60‡
Milwaukee, Wis.		2.25‡
Minneapolis, Minn.		2.32‡
Montreal, Que.		1.90
New Orleans, La.		2.20
New York, N. Y.		1.77@2.25‡
Norfolk, Va.		2.17
Oklahoma City, Okla.		2.46‡
Omaha, Neb.		2.36‡
Peoria, Ill.		2.27‡
Philadelphia, Penn.		1.85@2.41‡
Phoenix, Ariz.		3.70
Pittsburgh, Penn.		2.09‡
Portland, Colo.		2.80
Portland, Ore.		2.90
Reno, Nevada	.75¼	3.01
Richmond, Va.		1.69@2.44
Salt Lake City, Utah	.70¼	2.81
San Francisco, Calif.		2.31‡
Savannah, Ga.		2.50
St. Louis, Mo.	.55	2.20‡
St. Paul, Minn.		2.32‡
Seattle, Wash.	10c discount	2.65
Tampa, Fla.		2.60
Toledo, Ohio		2.20‡
Topeka, Kans.		2.41‡
Tulsa, Okla.		2.33‡
Wheeling, W. Va.		2.17
Winston-Salem, N. C.		2.78

NOTE—Add 40c per bbl. for bags.
†Delivered on job in any quantity, sacks extra.
‡Ten cents less to dealers.

Mill prices f.o.b. in carload lots, without bags, to contractors.

	Per Bag	Per Bbl.
Buffington, Ind.		1.85
Chattanooga, Tenn.		2.45*
Concrete, Wash.		2.35
Davenport, Calif.		2.05
Detroit, Mich.		2.15
Hannibal, Mo.		2.05
Hudson, N. Y.		2.05
Leeds, Ala.		1.95
Mildred, Kans.		2.35
Nazareth, Penn.		1.95
Northampton, Penn.		1.95
Richard City, Tenn.		2.05
Steelton, Minn.		1.90
Toledo, Ohio		2.20
Universal, Penn.		1.85

*Including sacks at 10c each.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	White Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	—Plaster Board— ⅜x32x 36". Wt. 1500 lb. Per M Sq. Ft.	—Plaster Board— ½x32x 36". Wt. 1850 lb. Per M Sq. Ft.	Wallboard, ½x32 or 48". Lgths. 6'-10', 1850 lb. Per M Sq. Ft.
Arden, Nev. and Los Angeles, Calif.	3.00	8.00u	8.00u	10.70u	10.70u					11.70u			
Centerville, Iowa	3.00	10.00	15.00	10.00	10.00	10.50	13.50			13.50			
Detroit, Mich.‡				11.30	11.30	11.30		8.00					
Delawanna, N. J.						8.00		8.25@9.40			.14½s	.15½s	40.00@41.00
Douglas, Ariz.			7.00			15.50d	18.50		30.00	15.50			
Grand Rapids, Mich.	2.75	6.00	6.00	8.00	9.00	9.00	17.50		24.55	20.00			
Gypsum, Ohio‡	3.00	4.00	6.00	9.00	9.00	9.00	19.00	7.00	27.00	19.00		15.00	30.00
Hanover, Mont.				11.80									
Los Angeles, Calif.			10.40	10.40k									
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00		20.00	30.00
Portland, Colo.				10.00									
San Francisco, Calif.				13.40r	14.40r		15.40r						
Seattle, Wash.	6.50		11.00	16.00									
Sigurd, Utah									21.50				
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00					20.00	25.00	33.00

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable).
*To 3.00; †to 11.00; ‖to 12.00; ‡prices per net ton, sacks extra; (a) to 25.00; (b) net; (c) gross; (d) hair fibre; (e) delivered; (h) delivered in six states; (i) delivered on job; (k) sacks 12c extra, rebated; (m) includes paper bags; (o) includes jute sacks; (r) including sacks at 15c; (s) per board; (t) to 16.50; (u) includes sacks; (v) F.O.B. N. Y. C. and dealers yard in mill locality.

Market Prices of Cement Products

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point

City of shipping point	Sizes 8x8x16	8x10x16	8x12x16
Camden, N. J.	17.00	.....	.....
Columbus, Ohio	.16@.18a	.....	.....
Detroit, Mich.	.16	.....	.26
Forest Park, Ill.	18.00*	23.00*	30.00*
Grand Rapids, Mich.	.15	.....	.....
Graettinger, Iowa	.18@.20	.....	.....
Indianapolis, Ind.	.14@.16†	.....	.....
Los Angeles, Calif.¶	5¾x3½x12—55.00	7¾x3½x12—65.00	
Oak Park, Ill.	.18@.21a	.....	.....
Olivia and Mankato, Minn.	9.50b	.....	.....
Somerset, Penn.	.20@.25	.....	.....
Yakima, Wash.	20.00*	.....	.....

*Price per 100 at plant. †Rock or panel face. (a) Face. ‡Delivered. ¶Price per 1000. (b) Per ton.

Cement Roofing Tile

Prices are net per sq. in carload lots, f.o.b. nearest shipping point unless otherwise stated.

Camden and Trenton, N. J.—8x12, per sq.

Red	15.00
Green	18.00

Chicago, Ill.—per sq. 20.00

Cicero, Ill.—Hawthorne roofing tile, per sq.

	Chocolate Red and Orange	Green and Blue	Yellow, Tan and Slate Gray
French and Spanish†	$11.50	$13.50	$12.75
Ridges (each)	.25	.35	.30
Hips	.25	.35	.30
Hip starters	.50	.60	.60
Hip terminals, 2-way	1.25	1.50	1.50
Hip terminals, 4-way	4.00	5.00	5.00
Mansard terminals	2.50	3.00	3.00
Gable finials	1.25	1.50	1.50
Gable starters	.25	.35	.30
Gable finishers	.25	.35	.30
*End bands	.25	.35	.30
*Eave closers	.06	.08	.06
*Ridge closers	.05	.06	.05

*Used only with Spanish tile.
†Price per square.

Houston, Texas.—Roofing Tile, per sq.

Red	17.00
Green	19.50

Indianapolis, Ind.—9"x15"

Gray	10.00
Red	11.60
Green	13.00

Waco, Texas: Per sq.

4x4	.60

Cement Building Tile

Cement City, Mich	Per 1000
5x4x12	40.00
5x8x12	55.00
Detroit, Mich.	Per 100
5x4x12	4.50
5x8x12	8.00
Longview, Wash. (Stone Tile)	Per 1000
4x8x12	65.00
Mt. Pleasant, N. Y.:	Per 1000
5x8x12	78.00
Grand Rapids, Mich.:	Per 1000
5x8x12	70.00
Houston, Texas:	
5x4x12 (Lightweight)	45.00
5x8x12 (Lightweight)	80.00
Pasadena, Calif.—(Stone Tile	Per 100
3½x4x12	3.00
3½x6x12	5.00
3½x8x12	6.00
Wildasin Spur, (Building Tile) Los Angeles, Calif.:	Each
4x3½x12	.03½
6x3½12	.04½
8x3½x12	.05½
Yakima, Wash.—Building tile:	
5x8x12	.10

Cement Drain Tile

Graettinger, Iowa drain tile per 100 ft.	
5-in.	4.50
6-in.	5.60
8-in.	9.00
10-in.	12.00
12-in.	17.50
14-in.	25.00
16-in.	35.00
18-in.	45.00
20-in.	60.00
22-in.	70.00
24-in.	80.00
30-in.	100.00
Olivia and Mankato, Minn.—Cement drain tile, per ton	8.00
Tacoma, Wash.—Drain tile per ft.:	
3 in.	.04
4 in.	.05
6 in.	.07½
8 in.	.10
Waukesha, Wis.—Drain tile, per ton	9.00

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	20.00	30.00@35.00
Baltimore, Md. (Del. according to quantity)	15.50	22.00@50.00
Camden and Trenton, N. J.	17.00	
Ensley, Ala. ("Slagtex")	14.50	22.50@33.50
Eugene, Ore.	25.00	35.00@75.00
Friesland, Wis.	22.00	32.00
Longview, Wash.	18.00	25.00@75.00
Milwaukee, Wis	15.00	30.00@50.00
Mt. Pleasant, N. Y.		14.00@23.00
Omaha, Neb.	18.00	30.00@40.00
Pasadena, Calif.	12.50	
Philadelphia, Penn.	15.00	20.00
Portland, Ore.	17.00	25.00@75.00
Prairie du Chien, Wis.	14.00	22.50
Rapid City, S. D.	18.00	25.00@40.00
Waco, Texas	16.50	32.50@125.00
Watertown, N. Y.	20.00	35.00
Wauwatosa, Wis.	14.00	21.00@42.00
Winnipeg, Man.	14.00	22.00
Yakima, Wash.	22.50	

†Gray. ‡Red.

J. P. Wagner Chosen Manager of Southern Products Association

THE Cement Products Manufacturers Association, recently organized in Miami, Fla., and composed of 48 manufacturers of concrete building blocks and tile and kindred building materials, has engaged the services of John P. Wagner of Kentucky as executive manager for the association, according to an announcement in the Miami (Fla.) *Herald*. The association was formed to promote the standardization of the cement products manufactured and to establish higher business ethics in the industry, as well as to work in conformity with the requirements of the Miami building code.

Mr. Wagner has had many years of successful activity in civic management, education and business promotion and industrial development work as an organizer. He is a pioneer in the development of concrete products and has a wide range of experience in the building construction field. Offices of the association, with Mr. Wagner in charge, are in the Windsor building, 507 N. E. First avenue, Miami.

Asbestos-Cement Products Plant To Be Built at St. Louis

THE Asbestos Shingle, Slate & Sheathing Co., Ambler, Penn., has purchased 15 acres of land at St. Louis, Mo., as a site for a western factory for making its asbestos shingles, corrugated roofing, asbestos lumber and other asbestos products. The tract is located on the city line to the north of St. Louis. It extends along the Chicago, Burlington and Quincy railroad and is adjacent to a large cement plant that will supply the large quantities of cement used in the manufacture of the company's products. Building operations are to be started at once.

The company has also started enlarging their asbestos-cement shingle plant at Ambler, Penn.

Silica Sand Plant Damaged by Fire

A RECENT FIRE destroyed a large part of the silica sand plant of the Standard Plate Glass Co. at Butler, Penn. The loss to equipment and structure is reported at about $100,000. The company is planning to rebuild at once.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted.

Culvert and Sewer	4 in.	6 in.	8 in.	10 in.	12 in.	15 in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.
Detroit, Mich.								15.00 per ton									
Graettinger, Iowa	.04½d	.05½	.08½	.12½	.17½	.....	.40	.50	.60	.70	.....	.....	.....	.....	.....	.....	.....
G'd Rapids, Mich. (b)	.....	.....	.....	.60	.72	1.00	1.28	.....	.....	1.92	2.32	3.00	4.00	5.00	6.00	.....	.....
Houston, Texas	.....	.19	.24	.43	.55½	.90	1.30	.....	†1.70	2.20	.....	.....	.....	.....	.....	.....	.....
Indianapolis, Ind. (a)	.....	.....	.....	.80	.90	1.10	1.30	.....	.....	1.70	.....	2.70	.....	.....	.....	.....	.....
Longview, Wash.								Sewer pipe 40% off list, culvert—list									
Mankato, Minn. (b)	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.50	1.75	2.50	3.25	4.25	.....	.....	.....
Olivia & Mankato, Minn.												12.00 per ton					
Paullina, Iowa‡	.....	.....	.....	.....	.....	.....	.....	2.25	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Somerset, Penn.	.....	.....	.....	.....	1.08	1.25	1.65	.....	.....	2.50	.....	3.65	4.85	7.50	8.50	.....	.....
Tacoma, Wash.	.15	.18	.22½	.30	.40	.55	.80	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tiskilwa, Ill. (rein.) (a)	.....	.....	.....	.65	.75	.85	1.10	1.60	.....	1.90	.....	.....	3.40	.....	.....	.....	.....
Wahoo, Neb. (b)	.....	.....	.....	.....	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	4.62	6.14	6.96	7.78
Waukesha, Wis.								12 in. to 60 in. 18.00 per ton									
Yakima, Wash.								$10.00 per ton									

*30-in. lengths up to 27-in. diam., 48-in. lengths after; (a) 24-in. lengths; (b) Reinforced; (c) Interlocking bar reinforced.
†21-in. diam. ‡Price per 2 ft. length. (d) 5 in. diam. [1]@1.08. [2]@1.25. [3]@1.65. [4]@2.50. [5]@3.85. [6]@5.00. [7]@7.50.

George W. Nast and F. W. Mumm Killed in Accident

GEORGE W. NAST, general manager of the Western Lime and Cement Co. of Milwaukee, Wis., was killed in an automobile accident at Butternut Wis., Friday, June 11. F. W. Mumm, who was superintendent of the company's plant at Brillion, Wis., was killed at the same time. The automobile in which they were riding was struck on a grade crossing by a Soo line express train. Mr. Nast was killed instantly and Mr. Mumm died on the train as he was being taken to a doctor.

George W. Nast was one of the important figures in the rock products industries of the middle west, and the business which he and his associates have built up is one of the greatest. It produces lime, crushed stone and sand and gravel and operates a number of plants in Wisconsin and Illinois. The business is historic as it was founded by his grandfather, who came to Wisconsin from Germany back in the middle years of the last century. August Nast, his son, the father of George W. Nast, came to Wisconsin on account of the descriptions of the dolomite deposits of Wisconsin which his father had sent home, seeing in them a chance to build up an important business in what was then a new country. It was so new that August Nast reached it (in 1869) by landing at Quebec, sailing through the Great Lakes and finally driving to Marblehead, Wis., from Fond du Lac with an ox team.

Settlers coming into the new country were glad of an opportunity to buy the lime they so much needed for the homes they built. But the business did not have a chance to expand until 1880 when the railroad came. After that it grew steadily to its present proportions.

George W. Nast was born at Marblehead, Wis., in 1882, and reared in this limestone country. At fifteen years of age he started his career in the lime business as water-boy at his father's plant, which was then operated under the name of Nast Brothers. By hard work and perseverance he worked up through various positions until in 1902, when the firm was incorporated as Nast Brothers Lime and Stone Co., George, then only twenty years of age, was made vice-president.

In 1920, Nast Brothers Lime and Stone Co. merged with the Union Lime Co. and formed the Western Lime and Cement Co., having its main office in Milwaukee, and 11 plants in the state of Wisconsin with 54 kilns producing 6,000 bbl. of lime a day. This consolidation enabled the new company to effect economies in production and distribution, and it now serves the central west through a large number of service yards located in various cities and towns. Mr. Nast was appointed general manager of the new corporation, which position he held to the time of his death.

The funeral of Mr. Nast was held at the Scottish Rite Temple, Milwaukee, Monday afternoon June 14, the services being especially in charge of the delegates from the Fountain Lodge, Fond du Lac, in which Mr. Nast had long been a member.

George W. Nast

They were assisted by members of the Tripoli Temple. More than 250 attended the services. Mr. Nast was a 32nd degree Mason, a Knight Templar and a Shriner. Mr. Nast's father, August Nast, accompanied by his mother, his widow and two sons, 14 and 16 years of age, attended the burial, which was at Fairview mausoleum.

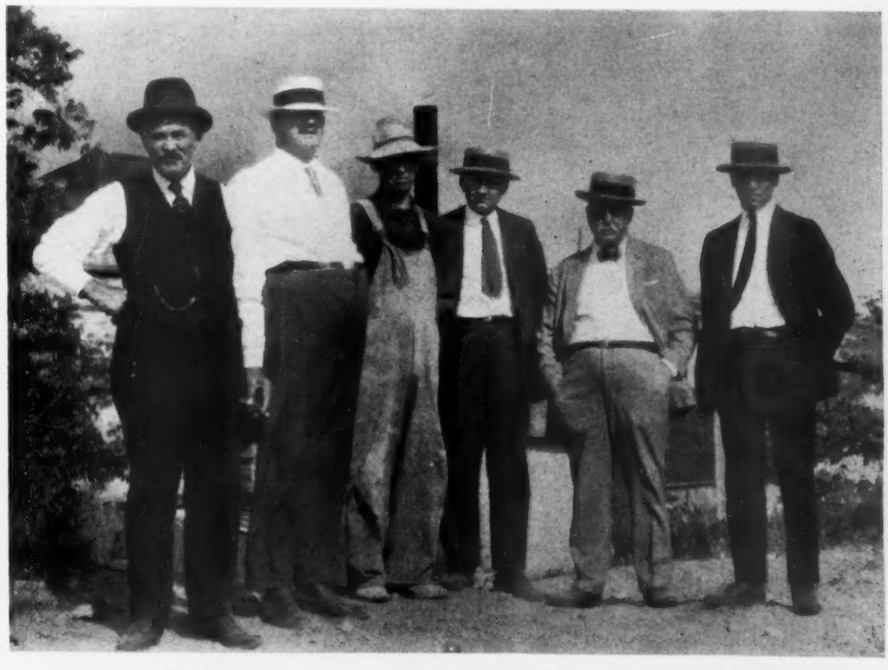
The pall bearers at the funeral were: R. C. Brown, O. W. Robertson, M. J. Ash and E. C. Waite, all officers or directors in the Western Lime Co.; Joseph Hock, president, and Charles Woodward, of the Wisconsin Lime and Cement Co.; J. J. Cronin, president of the Consolidated Co. and James Fryer, secretary of the Wisconsin Lime Mananufacturers' Association.

Ferdinand W. Mumm was originally connected with the Ormsby Lime Co. at Brillion, Wis. Some years ago this company affiliated with the Union Lime Co. and at that time Mr. Mumm became superintendent of the plant. Later, he was made superintendent of all the Union company's plants. When the Union company and Nast Bros. Co. consolidated in 1920 to form the Western Lime and Cement Co., Mr. Mumm was made superintendent of all the 11 plants of the Western Lime and Cement Co. Mr. Mumm is survived by his widow.

Mr. Mumm was a Mason, Odd Fellow, Woodman, mayor of Brillion and president of the Calumet County bank.

Bailey Sand Co. Expanding

THE Bailey Sand Co., Fremont, Neb., is making improvements to its pit and plant that are expected to more than double the output of sand and gravel. The company has been growing steadily since it was established a few years ago. The new plant equipment consists of a 75-hp. motor to replace the 30-hp. motor and a 6-in. pump in place of a 4-in. While the shift over to the new equipment is being made there will be no interruption in the business.—*Fremont (Neb.) Tribune.*



Group of officials of Western Lime and Cement Co., including the late General Manager Nast and General Superintendent Mumm. From left to right: August Nast (father of George W. Nast), Ferdinand W. Mumm, Rudolph Kruschinski, superintendent at Brillion, Wis., Mr. Arnold of Arnold & Weigel, Woodville, Ohio; R. C. Brown and George W. Nast

New Machinery and Equipment

Ball-Bearing Hanger Box

T. B. WOOD SONS CO., Chambersburg, Penn., announces the adoption of the Fafnir bearing as an incorporated part of its line of transmission equipment. Fafnir ball bearings have been used in "U. G." hanger boxes, Wood's loose pulleys and friction clutches for many years, but they are now adopted as standard part of the entire Wood line of products. The housings are made in several styles with bosses designed to suit the different types of hanger frames thus allowing, it is said, plain or babbitted bearings to be replaced without removing the present hanger frames. The new Wood-Fafnir ball bearing hanger box, it is said, needs no adjustment when mounting on the shaft. It is simply necessary to slide the box and the two locking collars to place on the shaft and into the frame, then draw up the frame bolts and tighten the collars. The hanger box is dust-proof and leak-proof. Lubricant is applied through two tapped holes which are fitted with standard pipe plugs. Lubrication is necessary only twice a year.

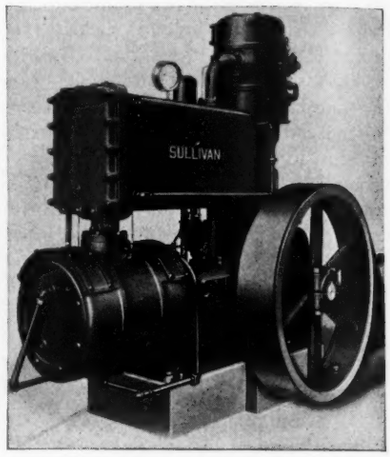
Ball-bearing hanger box

Angle Compound Compressors

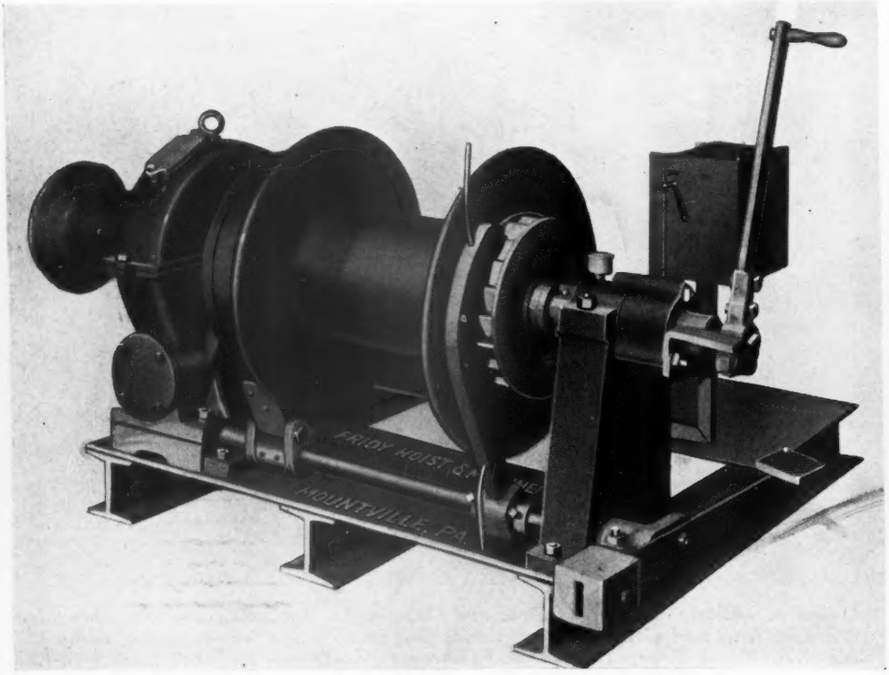
THE Westinghouse Electric and Manufacturing Co., East Pittsburgh, Penn., recommend the angle compound types of compressors to quarry operators and others to be used in operating machinery, pumping water and for cleaning purposes. In speaking of these compressors the Westinghouse company mentions especially those made by the Sullivan Machinery Co., Chicago, and says:

"The distinctive feature of the angle compound design is that the high-pressure and low-pressure cylinders are mounted at right angles to each other, and both pistons are actuated from one crank so as to give perfect balance of reciprocating forces. The air is compressed first in the horizontal cylinder, and then travels through a three-pass, counter-current, water intercooler to the vertical cylinder, where it is further compressed. Water inlet and outlet valves and automatic lubrication insures uninterrupted operation. The machine may be driven by a belt or direct connected to an electric motor. The capacity is from 400 to 1800 cu. ft.

"Another compressor which is composed of two angle compound compressors mounted side by side and driven from the same power unit, is built in sizes of 900 to 3700 cu. ft. When the demand for air is light, either compressor may be operated efficiently alone with the other one standing still."



Angle compound compressor



Drum type car puller with friction type drive

Drum Type Car Puller

DRUM type care pullers specially constructed for handling heavy hauls in the spotting of loaded railroad cars are announced by the Fridy Hoist and Machinery Co., Mountville, Penn. These types are said to be especially useful in pulling cars which are so far distant that they can not be reached by using the shorter lengths of manila rope generally used with the vertical capstan type of car puller.

The type of car puller illustrated is furnished with a 10-hp. motor drive which is fully enclosed to protect it against the weather. The drive is of the self-starting type in the a.c. and will operate directly across the line. The drum is wide face and the manufacturers say that it will handle about 600 ft. of 5/8-in. wire cable at a rope speed of 30 ft. per min.

The drum is engaged by a double cone friction clutch, asbestos lined, and operates free on the shaft. It is put into service by a forward movement of the vertical lever which operates the screw thrust. The drive is a combination of worm gear and spur gear with a speed reduction of about 60 to 1. A wide face band brake holds the drum and

ratchet for controlling the cars on inclines.

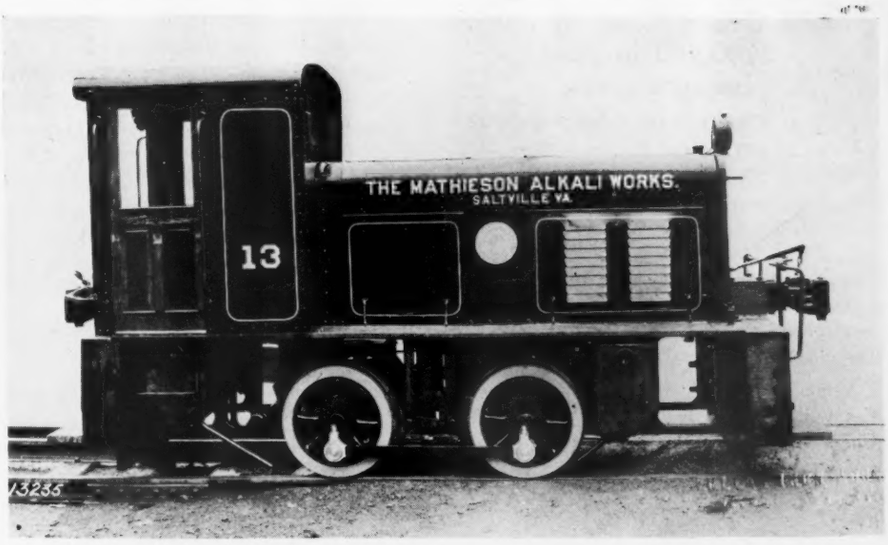
The complete car puller is mounted on an I-beam steel sub-base and is so designed that it can be installed on a foundation. For handling of heavy hauls about the yard this type of car puller is said to be quite economical and to require only one man to handle a haul of 130 tons on a slight grade.

Eight-Ton Gasoline Locomotive With Three-Point Suspension

THE Vulcan Iron Works, locomotive builders of Wilkes-Barre, Penn., say that they are prepared to furnish their gasoline locomotives in all sizes from eight tons up equipped with elliptic springs and cross-equalizers, giving three-point suspension of the chassis. With this design derailment is not easy, as the weight of the locomotive is equalized on all the bearings regardless of any unevenness or irregularities in the track.

Three-point suspension is standard practice on steam locomotives. Vulcan electric locomotives are of this design, and the heavier Vulcan gasoline locomotives (from 16-ton up) have always been so constructed, according to a report received from the manufacturers.

This new type of gasoline locomotive has already been introduced in the rock products industry. Recent purchases have been made by a large cement company in Canada and some of the leading sand and gravel and crushed stone producers on the Atlantic coast.



Eight-ton gasoline locomotive with three-point suspension, similar to practice on standard steam locomotives

Standardized Units for Sand and Gravel Production

A STEP toward standardization has been taken by the Morrow Mfg. Co., Wellston, Ohio, in the development of assembled standard units for the processing of sand and gravel. These are made in both feeder and elevator types, and in three capacities—20-, 40- and 60-cu. yd. per hour.

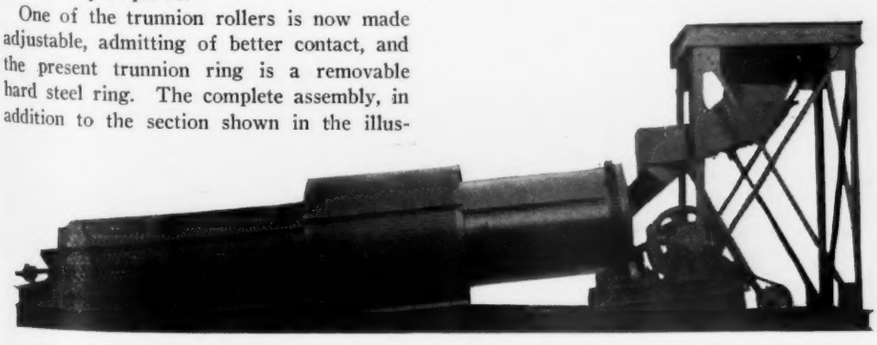
The assembly illustrated is a 40-yd. feeder unit and includes recent improvements which have not yet appeared in the company's catalogue. The principal change has been the introduction of a small sub-base under the driving mechanism of the screen, making it possible to use standard bearings for the central drive instead of special bearings, as formerly required.

One of the trunnion rollers is now made adjustable, admitting of better contact, and the present trunnion ring is a removable hard steel ring. The complete assembly, in addition to the section shown in the illustration, includes a bar grizzly above the hopper and one or more settling tanks of the drag type underneath the steel frame, the number depending upon the sizes of sand desired.

The feeder is of the cradle type, the flow of material being regulated by means of a slide valve mounted in the throat of the hopper. The movement of material is obtained by agitating it up and down by a connecting rod between the feeder and an adjustable disc, this latter being for the purpose of controlling the flow of material to the screen when the valve in the hopper is open.

The entire assembly is designed to be driven by one power unit.

The feeder type as described is intended to be used with cableway delivery of material, while the elevator type will be used with dump cars or other equipment at ground level.



Standard assembled unit for processing sand and gravel. This is the feeder type, as distinguished from the elevator type

Welding a Crusher Saves It for Service at Low Cost

THAT it pays to call upon technical welding service is well illustrated by an incident at a large plant in the West. A sledge hammer, dropped accidently into the feed chute, completely smashed a big jaw crusher. Several pieces broke off square, and cracks developed in the main casting. This company does a large amount of welding and cutting, so the superintendent naturally thought of repairs; but he felt that this job was a little beyond the experience of his own men. There seemed to be only one solution: Buy a new crusher and sell the old one for junk. Orders to this effect had just been given when an oxy-acetylene service operator came to the plant on a routine call.

Conversation naturally turned to the question uppermost in the superintendent's mind, "Couldn't that crusher have been welded?" The operator thought that perhaps it could and asked to see it. It had actually been sold to a scrap dealer who strangely enough was at that very moment hauling it out of the plant. Inasmuch as the repair was a perfectly possible piece of work, the operator asked to have the junk man relieved of his purchase and preparations were started to weld it.

The nature of the breaks and the general design made it unnecessary to preheat the entire casting. Two oil-burning torches were used for this purpose. Before long it became evident that the preheating was lagging because of the poor performance of a small air compressor supplying the oil-burning torches. Preparations were therefore interrupted long enough to tear down the compressor. Examination showed three valve seats pushed out. In about an hour of actual welding time the service operator bronze-welded three new seats in the compressor, carefully explaining the procedure to the plant operators.

With adequate air pressure, the work of preheating the crusher was rapidly completed. Even with the somewhat adverse conditions and high labor charge, the total repair cost less than $200, whereas a new casting would have required an investment of $2000. The junk man can often be called too soon!—*Oxy-Acetylene Tips.*

Mobile Gravel Concern Spends $100,000 in New Improvements

THE purchase of river front property at a cost of $50,000 and the expenditure of an additional $50,000 for equipment was announced recently by R. H. Radcliffe, president of the Gulf Barge and Towing Co., one of the oldest and largest sand and gravel companies in Mobile, Ala. Changes will include installation of a 200-ft. steel crane and unloader and construction of additional storage bins.

When completed, concentration of facilities will give the Gulf Barge and Towing Co. storage room for 50,000 tons of sand and gravel at the foot of Palmetto street, where offices and yards are situated. Much gravel is now stored at Arlington.

The company maintains terminals at Tampa and St. Petersburg, Fla., and at points on the Mississippi sound, but does most of its coastwise business with Tampa. Rail distribution of gravel plays a large part in the company's business.

Two unloader machines, which will be augmented, now can handle 3700 yd. of gravel daily, said Mr. Radcliffe. These machines are placed on the present holdings. The recent purchase of river frontage brought the total frontage to 700 ft., providing space for unloading and storage. There are three revolving cranes and wharf equipment in place.

Installation of the 200-ft. crane will permit simultaneous handling of gravel from river barge into seagoing barge, or river barge to storage chute or railroad car.

Under the scheme of expansion, said Mr. Radcliffe, the company which now has its barges and towing equipment built to order will move its machine shop (now at Palmetto street) to Bayou Sara, where are located the barge yards, and will assemble fabricated barges to be built at Birmingham, and may build its towboats there.

Demand for gravel from Mobile and outside sources has kept the plant on night and day shifts, said Mr. Radcliffe.

The Gulf Barge and Towing Co. handles only Radcliffe sand and gravel, drawn from pits in Alabama. All the gravel used in the Gandy bridge at Tampa was furnished by the Gulf company, which also has supplied most of the gravel for construction in Tampa, where it operates the Tampa Coal Co., with equipment for handling 2500 yd. of gravel daily. The Gulf Barge and Towing Co. also represents the R. P. Hyams Coal Co. of New Orleans, La.

The company operates a fleet of towboats and river and seagoing barges and has four dredges.—*Mobile (Ala.) Register.*

White Cliffs Limestone Property Again Changes Hands

THE large limestone deposits on the Little river at White Cliffs, Ark., have again changed hands. The Lime Products Co. of Fordyce, Ark., is the new owner. A. B. Banks, former owner of the property, is president of the holding corporation.

The property was sold on execution which was issued after foreclosure proceedings in the Little River county court. The consideration was $325,000. The mortgage which was foreclosed was held by the Banks' interests.

There is rumor of another attempt being made at some early date to develop the property by the erection of a large cement plant and a still larger lime products plant on the property, but there is no confirmation of this rumor so far.

The property consists of 900 acres of high calcium stone, and is said to be one of the largest deposit of this material in the world. Numerous attempts have been made to develop the resources there, but so far the development has proven too large an undertaking, involving staggering sums of money. The first plant on the property many years ago manufactured a good grade of cement. The lack of the proper facilities for handling the material and the proper fuel is said to have caused the first plant to go into the hands of a receiver. Since then two plants for the manufacture of material have been erected on the property, but neither have been successful. It was the purpose of the White Cliffs Corp. to erect large plants on the property, in addition to the present plant there, but their project did not materialize, and it was necessary to foreclose the mortgage.—*Nashville (Ark.) News.*

Machinery Contract Awarded for New Cumberland Cement Plant

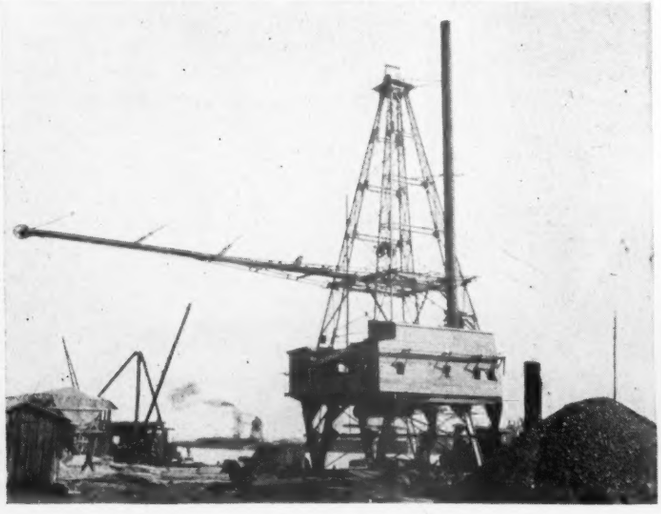
RELATIVE to the new plant of the Cumberland Portland Cement Co. at Cowan, Tenn., Ralph T. Miller, general manager, writes to ROCK PRODUCTS as follows:

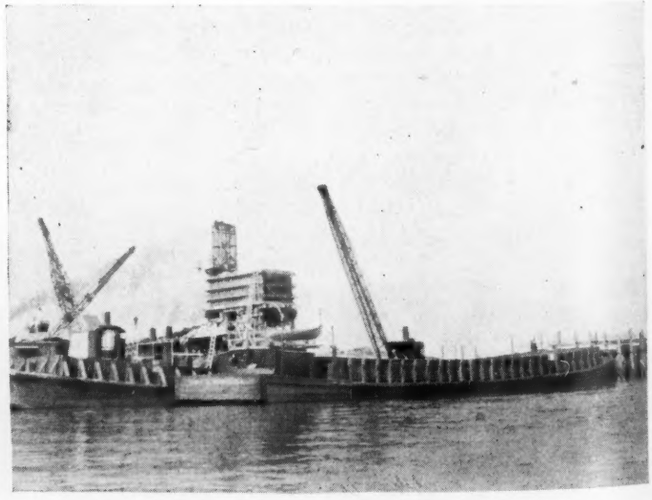
"We are building a 2000-bbl. combination white and gray cement plant. The order for the principal machinery was awarded to the Allls-Chalmers Co. of Milwaukee, Wis., on May 29, and ground was broken on June 10. Contracts for auxiliary machinery are being placed rapidly, and the working schedule outlined calls for completion March 1, 1927. The property was proven up by the Pittsburgh Testing Laboratory and raw materials are of a very suitable quality."

It is understood that there will be two kilns of 10-ft. diameter and 150 ft. long.

At a recent meeting of the company the following officers were elected: W. V. Davidson, president; J. R. Greene, vice-president; H. M. Greene, secretary-treasurer; Ralph T. Miller, general manager, and Frank Pearson, assistant general manager.

These men are principally identified with the business life of Nashville, and an office will be maintained in that city.





Left—New unloading machine under construction at the Mobile docks of the Gulf Barge and Towing Co. Right—Company barge unloading sand and gravel at the new $10,000,000 state dock at Mobile, Ala.

Crushing Plant Equipment

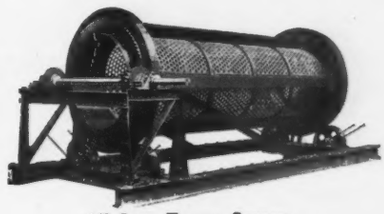
The many crushing plants which have been completely equipped by the Allis-Chalmers Manufacturing Company is evidenced by the satisfactory service which these plants are giving. The Allis-Chalmers Manufacturing Company takes the entire ***responsibility*** for the design of the plant and its equipment. These plants are built on the highest engineering standard following the best engineering practices.

Our Engineers are at your service to make complete installation drawings

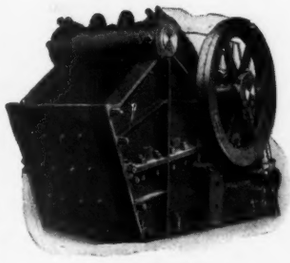
Gates No. 27 Gyratory Crusher, having two openings, each 54 in. x 141 in.

The Gates Style N Crusher which has been developed in all sizes, is the result of 40 years' accumulated experience of the engineers and designers of the Gates Iron Works and the Allis-Chalmers Mfg. Co.

The durability, simplicity and efficiency of the Gates Patented All-Iron Frame Screens is unequalled by any other screen on the market.



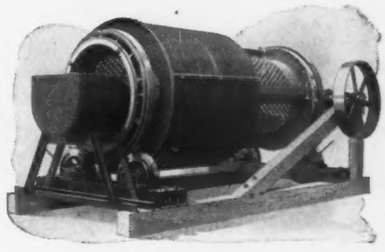
All Iron Frame Screen



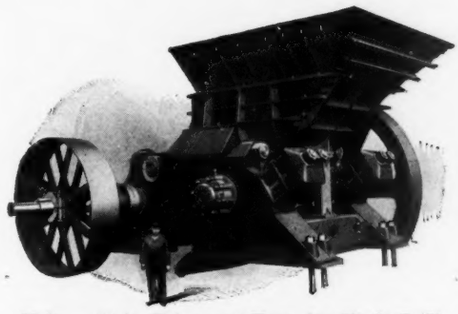
Jaw Crusher

The company has also developed in all sizes Jaw Crushers for crushing copper ore, blast furnace flux and ballast stone.

Gates Screens are built in numerous sizes, ranging from 24-in. diameter by 8 ft. long to 72 in. diameter by 24 ft. long. Open End Scalping Screens of the Cylindrical type are built in sizes ranging from 48 in. to 72 in. diameter.

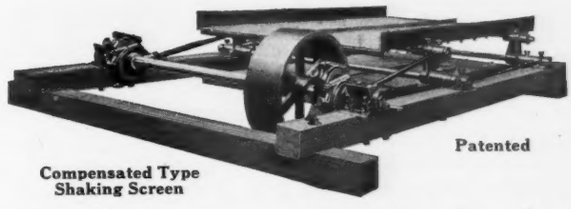


Style "B" Open End Revolving Screen



60 in. x 48 in. Fairmount Type (or Single Roll) Crusher

The Fairmount Crusher is intended to crush limestone, dolomite, phosphate rock, magnesite and other less tenacious rocks. It is not suitable for, nor do we recommend it for granites, trap rock or other igneous rock.



Compensated Type Shaking Screen

Patented

By balancing one screen against the other, much of the vibration in the frame and building is eliminated. Up-to-date commercial limestone and gravel plants realize the vital importance of installing shaking screens permitting the production of smaller stones to meet the market requirements.

Write for Our Bulletins

ALLIS-CHALMERS PRODUCTS
Electrical Machinery
Steam Turbines
Steam Engines
Gas and Oil Engines
Hydraulic Turbines
Crushing and Cement Machinery
Mining Machinery

ALLIS-CHALMERS MANUFACTURING COMPANY

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ALLIS-CHALMERS PRODUCTS
Flour and Saw Mill Machinery
Power Transmission Machinery
Pumping Engines-Centrifugal Pumps
Steam and Electric Hoists
Air Compressors - Air Brakes
Agricultural Machinery
Condensers

Dust Respirators Tested by Bureau of Mines

A STUDY of various types of respirators designed as safeguards against the presence of injurious dusts encountered in mining and many other industries has been conducted by chemists of the Pittsburgh experiment station of the Bureau of Mines, Department of Commerce. Many industrial dust respirators and many fabrics and filtering materials, including cheesecloth, canton flannel, bleached and unbleached muslin, filtering paper, and absorbent cotton, were tested. The filtering efficiencies of the respirators were determined by passing air containing either tobacco smoke or suspended silica dust in minute particles through the respirator at varying rates.

Tobacco smoke was used in the experiments for the reason that, being extremely difficult to arrest, it subjected the respirators to a severe test.

The efficiencies against silica dust floated in air ranged from about 9% to 70% for the dust respirators. The silica particles were mostly one micron in diameter, or four times the diameter of the tobacco-smoke particles. As the dusts most injurious to miners, stoneworkers and many others engaged in dusty trades are about one micron in diameter, the respirators, if worn, can prevent inhalation of a considerable amount of dust, but not all.

As the laboratory tests performed on the dust respirators were severe, the low efficiencies do not indicate the general efficiencies of these respirators under all industrial conditions. Many of the industrial dusts are less difficult to restrain, and the overall efficiency of the respirators in actual service is correspondingly higher. The tests thus show that as a rule the respirators are very beneficial in removing such injurious dust from inspired air.

While the use of respirators should be encouraged among workers in dusty industries, the Bureau of Mines tests show that respirators can not be considered a final safeguard. Effort should be continued in mines and other industries to prevent the formation and distribution of dust into the air, in mines particularly, by the use of hollow drill steel and water and by sprays on the undercutting machines.

Ohio Counties May Use State Aid to Build Gravel Roads

PERMISSION to change the type of the roads to be constructed in Ohio townships receiving state aid under the provisions of the Greene law has been granted to the county commissions by the Ohio state auditor.

The commissioners had made application to the state auditor, by means of resolution, for his approval of the change which would make the roads, hitherto specified as tarbound, gravel highways. The resolution made the request on the grounds that the funds were not sufficient for the more durable type of construction.—*Chillicothe (Ohio) Advertiser.*

Sand and Gravel Dealers Stop Strike in Brooklyn

BROOKLYN narrowly escaped a general tie-up of all building construction recently. It seems that one Monday morning word was received at the offices of N. Ryan and Co. and M. F. Kickey Co., two of the oldest established sand and gravel firms in Brooklyn, some of whose employes have been with their respective firms 25 and 30 years, that on Tuesday morning all their drivers would appear with union buttons and that the companies would be expected thereafter to recognize those union buttons. It was evidently assumed that these old employes would not be discharged and that thereby a start would be made toward unionizing all the masons' material yards in New York, according to Joseph Ryan of the N. Ryan Co.

The newly organized Greater New York Sand and Gravel Dealers Protective Association, Inc., was appealed to as well as the district attorney's office in the emergency, both being advised that the effort to keep the building material yards of Brooklyn on an open shop basis would be fought for and advising that strike-breakers had been employed to take the place of the discharged employes and that police protection would be required.

But by Thursday evening the old employes applied for their jobs without change as to scale or conditions. Mr. Ryan said that every dealer in Brooklyn was prepared to fight the effort to unionize the yards to the finish. In that event all building work in Brooklyn would have faced a shortage of material, if not an actual shut-down.—*Dow Building Reports.*

Concrete Engineer Vacancy at the Bureau of Standards

THE United States Civil Service Commission announces the following open competitive examination for a concrete engineer: Applications must be on file at Washington, D. C., not later than July 27. The examination is to fill vacancies in the Bureau of Standards, Department of Commerce, and in positions requiring similar qualifications, for duty in Washington, D. C., or elsewhere.

The entrance salary is $3800 a year. After the probational period required by the civil service act and rules advancement in pay without material change in duties may be made to higher rates within the pay range for the grade up to a maximum of $5000 a year. Promotion from lower to higher grades may be made in accordance with the civil service rules as vacancies occur.

The work of the Bureau of Standards includes many branches of physics, chemistry, engineering and technology, and offers valuable experience in these professions, combining as it does theoretical, experimental and practical work. The duties of the appointee will be in connection with original investigations in some field of the bureau's work. The chances for advancement are good for those who prove capable.

Competitors will be rated on their education, experience and fitness; and writings to be filed with the application.

Full information and application blanks may be obtained from the United States Civil Service Commission, Washington, D. C., or the secretary of the board of U. S. civil-service examiners at the post office or custom house in any city.

National Agstone Association Holds Summer Meeting

THE annual summer meeting of the National Agstone Association is to be held at Ohio State University, June 24 and 25.

Two years ago a very delightful and interesting meeting was held for the benefit of the Pennsylvania members at the State College of Pennsylvania, and last year the meeting was held at Ohio State Experimental Station at Wooster, Ohio.

The first day will be given over to a meeting of the members and directors of the association to be held at the Neil House. The meeting at the university will consist of a morning session devoted to field work and the afternoon session, in charge of Dr. Firman E. Bear, chief of soils department, Ohio State University.

An interesting program has been arranged and a full attendance is expected.

Atlantic Gypsum Company Takes Over Old Shipbuilding Plant

THE large plant of the Atlantic Corp. at Freeman's Point, N. H., used as a shipyard for the building of steel ships during the World War, has been taken over by the Atlantic Gypsum Products Co., Portsmouth, N. H., a new company recently organized. The Rock Plaster Corp. of New York will be a part of this new company, it was announced. The officers are: A. F. Bemis of the Bemis Bros. Bag Co., chairman of the board of directors; G. N. Roberts, president; H. B. Raynes, first vice-president; J. B. Woodhull, second vice-president, and W. P. Fuller, treasurer. Mr. Woodhull is also president of the Rock Plaster Corp.

The new company will also have plants in New York and in Nova Scotia, it is said. —*New York Tribune.*

Seven Killed by Premature Blast

SEVEN men were killed and seven injured by a premature explosion in a sand pit of the Berkeley Springs Glass Co. at Berkley Springs, W. Va. Two of the injured are reported to be in a critical condition.

The explosion occurred when the 14 men were preparing the final blast of the day.

Always under control

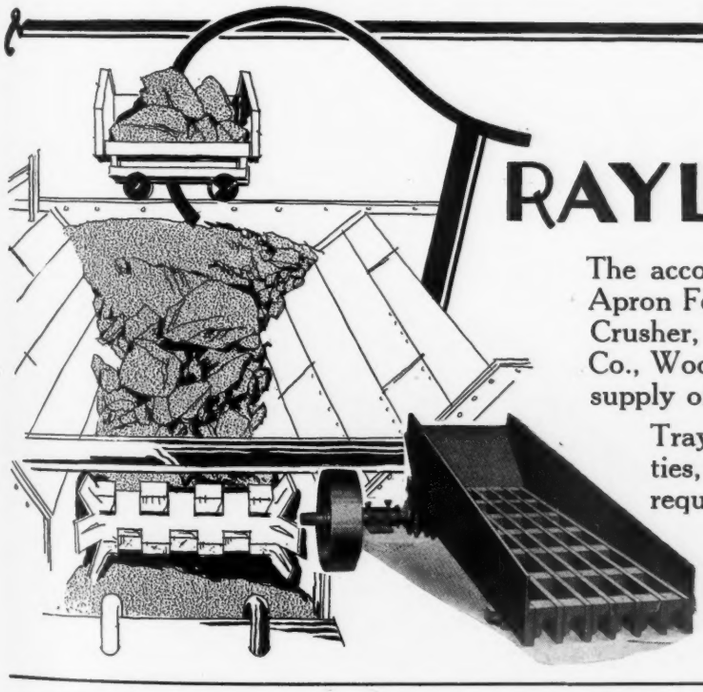
Control, the determining factor of good hydration, is the dominant feature of the Weber Hydrator.

The Weber is a batch type machine which turns out from four to six tons of perfect hydrate per hour. Its automatic proportioning of lime and water insure absolute uniformity under all conditions.

The design of the Weber Hydrator is adapted to the successful hydration of both high-calcium and high-magnesium limes. The Weber is simple and compact, economical in power requirements, easily accessible, and thorough in its mixing. It is the choice of discriminating lime producers.

ARNOLD & WEIGEL Woodville, Ohio

CONTRACTORS AND ENGINEERS



TRAYLOR GRIZZLIES

The accompanying sketch shows a Traylor 6x11-ft. Apron Feeder, installed over a Traylor 60x84-in. Jaw Crusher, at the plant of the Ohio Hydrate & Supply Co., Woodville, Ohio. This unit assures a dependable supply of stone up to 500 tons per hour.

Traylor Grizzlies are noted for their large capacities, and their absolute reliability of feed. They require little head room, and operate at minimum cost for power and maintenance. There are several types, adapted to various feeding conditions. Write office nearest you for further details.

TRAYLOR ENGINEERING AND MANUFACTURING COMPANY, Allentown, Penna.

NEW YORK 30 Church St. | CHICAGO 1414 Fisher Bldg. | LOS ANGELES I. W. Hellman Bldg. | SEATTLE 815 Alaska Bldg. | SALT LAKE CITY 100 W. 2nd South St.

TIMMINS, ONTARIO, CANADA, Moore Block

Export Department, 60 Water St., New York City—Cable Address: "Forsaltra"

International Machy. Co., Santiago, Chile.
International Machy. Co., Rio de Janeiro, Brazil.
Fraser & Chalmers (S. A.), Ltd., Johannesburg, S. A.
General Electric (S. A.), Buenos Aires
W. R. Grace & Co., Lima, Peru
British & Foreign Machy. Co., London
S. Oppenheimer & Co., Ltd., Rangoon, India

European Works: Ghent, Belgium, Usines Carels Freres

News of All the Industry

Incorporations

Glacial Sand and Gravel Co., Phillipsburg, N. J., $8,000 in preferred stock and 1000 shares of no par value. A. Fernosman, P. F. Beam and H. W. Hazen. (Attys., Smith & Smith, Phillipsburg.)

International Gypsum Co., Inc., Boston, Mass., $300,000. Irving Fielding, Thomas S. Mahoney and Christina Atkinson, 362 Commonwealth Ave., Boston.

Harmon Cast Stone Co., New York, N. Y., $6,000. J. Randazzo, J. J. Pollicino and A. Vainio. (Atty., H. S. Bird, Woolworth Bldg., New York.)

Peter Junni Co., Northport, Wash., $40,000. To engage in the quarrying business. Peter Junni, Floyd C. Smith and Theodore Bergman.

West Asheville Granite, Stone and Gravel Co., $100,000. James H. Buckner, 337 Waynesville Ave., Asheville, N. C., and others.

D. & G. Sand and Gravel Co., Passaic, N. J., $100,000. D. and L. Gierum and Hawley Dotey. (Atty., W. J. Schleich, Passaic, N. J.)

Montaup Sand and Gravel Co., Fall River, Mass., 250 shares of no par value. L. H. Callan, Bristol, R. I., and E. J. Stevens.

Pianta, Inc., San Antonio, Texas. $60,000. J. D. and H. Pianta, A. Cerodetti. To manufacture artificial stone.

Loudon Sand and Gravel Co., Loudon, Tenn., $12,000. S. P. Dannel, S. P. Wilson, D. P. Smith and others.

McFarlane Brothers, Inc., Seattle, Wash., $16,000. To handle sand, gravel, etc. A. L. and A. J. McFarlane.

Quality Gravel Co., Ltd., Toronto, Ont. J. V. Hunter, G. R. Hunter, C. W. Hunter and H. M. Sibley.

Dixie Granite Co., The Dalles, Ore., $100,000. William O. Patterson, H. C. Hurley and others.

Gadsden Sand and Gravel Co., Gadsden, Ala., $50,000. C. O. Duncan, O. R. Hood and others.

Black Marble and Lime Co., Enterprise, Ore., has increased its capital stock to $250,000.

Little Rock Concrete Products Co., Little Rock, Ark., $25,000. R. S. Lander.

Cardiff Green Granito Corp., New York, $30,000. (U. S. Corporation Co.)

Superior Sand and Gravel Co., Detroit, Mich., $1,000.

Weaver Sand Co., Inc., New Orleans, La., $5,000.

Quarries

S. P. Lively is building a new crushing plant at Yoakum, Tex. The new plant will be electrically operated and will have a capacity of about 15 cars of crushed stone per day.

Bichler Bros. Co. crushing plant at Escanaba, Mich., was damaged by recent fire of undetermined origin. The loss is estimated at $20,000.

Campbell-Horrigan Granite Co., Pittsburgh, Pa., is having plans prepared for an addition to its plant.

Granite Rock Co., of Watsonville, Calif., has let the contract for construction of office, warehouse and bunkers in San Jose, Calif., to cost $25,000.

Blackwater Stone Co., Blackwater, Mo., has agreed to furnish agricultural limestone to farmers of Saline County, Missouri, at a price of $1.75 per ton, delivered prepaid to any point in the county. In order to obtain this price, the farmers must place a pool order for 50 cars or more before July 1.

Lime

Idaho Lime Co.'s lime plant at Pebble, which has not been operated for a number of years, has again been put in active service, with Frank Little in charge. The plant will be enlarged within a short time.

Mulcahy Lumber Co., Tucson, Ariz., has installed and is operating a lime putty plant. The company uses lime from the Paul Quarry, Douglas, Ariz.

Atlas Mixed Mortar Co., Los Angeles, Calif., has moved from 2432 E. 8th St. to 2901 Santa Fe Ave.

Sand and Gravel

Gopher Stone Co., Minneapolis, Minn., was awarded contract by the Minneapolis city council to supply sand and crushed gravel for the coming year. The contract calls for 31,230 cu. yd. of sand at 80 cents a cu. yd. and 21,430 cu. yd. of gravel at $1.75 a cu. yd.

Fred C. Schulz, West Bend, Ind., has leased the gravel deposits near that place owned by Charles Hoppe. He has already installed a crusher and other equipment.

Tishomingo Sand and Gravel Co., Tishomingo, Okla., have reopened their plant and resumed shipments of sand and gravel.

Scott County, Iowa, has purchased the Snyder pit at Dixon, Iowa, for a reported price of $3,000. The deposit covers 3 acres. The county has also leased equipment for the manufacture of gravel from the Russell Grader Manufacturing Co., Minneapolis, Minn., which will be set up at the Snyder pit at Dixon. The plant includes loading bins and crushers. The annual rental of the plant is $2700, with an option to purchase within 3 years.

Feldspar

T. V. Whaley and G. L. Baldwin have acquired the feldspar quarry and brick manufacturing plant of the Laurel Brick and Sand Co., Laurel, Conn. The plant has not been operating for some time, but the new owners have plans under way for the early resumption of operations after new machinery has been installed and improvements made.

Cement

Warrior Cement Corp., Chattanooga, Tenn., is now shipping cement by barges from the mill at Spocari, Ala., to its new storage warehouse recently completed on property of the Underwood Coal and Supply Co. The warehouse, which has a storage capacity of 60,000 sacks, is of concrete and steel construction.

Old Mission Portland Cement Co., Standard Oil Bldg., San Francisco, Calif., is planning the construction of an aerial tramway at Hollister, Calif., starting at the base of Fremont Peak and running to the plant, a distance of about five miles.

North American Cement Corp., Albany, N. Y., has appointed the H. K. McCann Co., New York advertising agency, to direct its advertising account.

Cement Products

Decatur Cement Products Co., Decatur, Ill., has appointed L. H. Glen manager of the plant.

Dorman-Kampe Co., Vancouver, Wash., recently completed a new wet-mix concrete unit to be operated in conjunction with their crushing plant. First shipments of concrete have been made and used on local buildings. This is the first plant of its kind in the district.

National Reinforced Concrete Slab Co., Alexandria, La., is reported to be planning the erection of several plants in different towns, to cost about $15,000 each. J. D. Pace is manager of the company.

Harry Platt, formerly superintendent for Kendall & Delaney, Los Angeles, Calif., has purchased the art stone business of the late W. R. Farris and will continue the operation of same in the old location, 1432 Newton St., Los Angeles.

Northern Stone and Supply Co., St. Paul, Minn., has moved its offices to 4728 Lyndale Ave. N., Minneapolis, Minn. They are manufacturing a "Granitito" trim stone and a two-tone cast stone, under the management of J. T. Harrington, and W. R. Bell is sales manager.

California Ornamental Stone Co., Huntington Park, Calif., has begun erection of a warehouse and office building, to cost $1,000, at 629 W. Randolph St.

Wilson Concrete Products Co., Detroit, Mich., has changed its name to the Wilson Supply Co.

Springfield Concrete Products Co., Springfield, Mo., is planning the erection of a new plant for the manufacture of concrete brick and tile, to cost about $45,000 with equipment.

Martin Cement Products Co. has plans under way for the erection of a new one-story plant to cost about $30,000 with equipment. Crushers, concrete brick and the machinery and equipment for making these will be installed.

Cinder Block Corp., Baltimore, Md., has started to enlarge and improve their plant at a cost of about $60,000.

Diatomaceous Earth

The National Magnesia Co., Redwood City, Calif., announces that enlargements will be made to their mine located near Lompoc, Calif., to permit shipment of diatomaceous earth for commercial purposes.

Personals

L. B. Kirby, formerly with the Henry Crowell Lime and Cement Co., San Francisco, Calif., is now with the Calaveras Portland Cement Co.

Meyer L. Freed has resumed his position as research engineer with Henry A. Golwynne. Mr. Freed has temporarily discontinued his position as associate of the Bureau of Standards, where he has been carrying on research investigation on "Mullite," the new refractory material.

F. S. Bloom has been made production superintendent in charge of the gas producers firing the rotary kilns at the plant of the American Lime and Stone Co., Bellefonte, Penn.

Grant Davis, Pittsburgh, Pa., has been appointed advertising manager of the Marion Steam Shovel Co., Marion, Ohio.

M. L. Woodward of the Lehigh Portland Cement Co. was elected president of the Lehigh Valley Association of Engineers at their recent annual meeting at Allentown, Penn.

Obituary

Thomas W. McKeonn, formerly secretary-treasurer of the W. David Quarries Co., Hamilton, Ont., died recently after a long period of ill health.

Manufacturers

Alloy Cast Steel Co., Marion, Ohio, has recently been organized by John D. Owens, C. A. Owens, M. C. McNeil, H. J. Barnhart, Frank D. Glosser, Walter A. Dorsey and E. J. Schoenlaub, all of Marion, Ohio.

The company has purchased the electric steel foundry of the Fairbanks Steam Shovel Co., which was recently sold at receiver's sale. The plant is now being completely overhauled and enlarged to a capacity of 400 tons of steel castings per month. Extensive additions of modern foundry equipment will be installed at once.

The new company will manufacture high grade electric steel castings in carbon, manganese and other alloy steel.

Robert W. Hunt & Co., Ltd., Montreal, Canada, announce that they have a completely equipped cement testing laboratory in connection with their office in the Harbor Administration Bldg., Toronto. J. F. Keane is the Toronto manager.

Trade Literature

NOTICE—Any publication mentioned under this heading will be sent free unless otherwise noted, to readers, on request to the firm issuing the publication. When writing for any of the items kindly mention ROCK PRODUCTS.

Hayward Buckets and Equipment. Bulletin No. 627 on Hayward buckets and equipment in the mining, digging and distribution of sand and gravel. Illustrations and details of construction, etc. THE HAYWARD CO., New York, N. Y.

PURE IRON ERA. First issue of house organ of same title, containing interesting and instructive illustrated articles on iron and steel. THE AMERICAN ROLLING MILL CO., Middletown, Ohio.

Arc Welding. Descriptive bulletin on arc welding in General Electric Co. factories, illustrating types of equipment rehabilitated and apparatus and methods used in the process. GENERAL ELECTRIC CO., Schenectady, N. Y.

New Sullivan Bulletins. Bulletin 812 on rock drill tunnel carriages, **76-G** on portable single and double drum electric hoists, and **83-B** on single and two stage straight line air compressors for belt drive. Illustrations and details of design, etc. SULLIVAN MACHINERY CO., Chicago, Ill.